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FILL QUALITY GUIDELINES FOR LAKEFILLING IN ONTARIO: APPLICATION OF SEDIMENT AND WATER QUALITY GUIDELINES TO LAKEFILLING

Recommendations
to the Minister
of the Environment
and Energy

ACES
Advisory
Committee
on Environmental
Standards
Comité
consultatif
sur les normes
environnementales

Fill Quality Guidelines for Lakefilling in Ontario: Application of Sediment and Water Quality Guidelines to Lakefilling

Recommendations
to the Minister
of the Environment and Energy

Prepared by ACES

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TABLE OF CONTENTS

Executive Summary 1

Referral 3

Internal Review Process 3

Public Consultation Process 3

Results of Public Consultation 5

1.0 Support for the *Fill Quality Guidelines for Lakefilling in Ontario: Application of Sediment and Water Quality Guidelines to Lakefilling* 6

2.0 Classification Criteria
- 2.1 ACES' Understanding of the Criteria 6
- 2.2 General Approach 6
- 2.3 Unconfined Fill 8
- 2.4 Confined Fill 9

3.0 Sampling and Testing Requirements/Analytical Procedures/ Exceedences 9

4.0 Integration with Other Policies/Jurisdictions 11

5.0 Economic Implications/Availability of Material 11

6.0 Other Concerns 12

7.0 Clarification of Text 12

Summary of Recommendations 13

Appendices

I Summary of Public Comment

II Detailed Submissions Referring to Analytical Methodology

III List of Respondents to Lakefill and Materials Management Reviews

Back Cover: List of ACES members denoting which were on Subcommittee

EXECUTIVE SUMMARY

ACES Recommendation to the Minister of the Environment and Energy on: *Fill Quality Guidelines for Lakefilling in Ontario: Application of Sediment and Water Quality Guidelines to Lakefilling*

On March 25, 1992, the Advisory Committee on Environmental Standards (ACES) was asked by the office of the Minister of the Environment to undertake a technical review of the *Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario* and the *Fill Quality Guidelines for Lakefilling in Ontario: Application of Sediment and Water Quality Guidelines to Lakefilling*. On June 4, 1992, the Minister of the Environment, Ruth Grier, requested that ACES conduct a public consultation on the *Fill Quality Guidelines for Lakefilling in Ontario* (hereafter referred to as the "*Lakefilling Guidelines*"), and on July 12, 1992 made the same request for the *Proposed Policy for Management of Excess Soil, Rock and like Materials*. The decision was made to consult on both documents simultaneously, due to the interrelationships inherent in the disposal of excess material on land and in the water.

The consultation began with the mailout of information packages to approximately 5700 people during the week of September 9, 1992. Advertisements also appeared in 25 newspapers across the province. Two Information Sessions were held in Toronto and the public was invited to present its views at Deputation Meetings held in six cities. Written submissions were accepted until January 29, 1993. Of the 110 submissions received, 29 commented on the *Lakefilling Guidelines*.

After carefully reviewing all submissions, ACES recommends that MOEE:

- Proceed with the implementation of the *Lakefilling Guidelines*, taking into account the provisos contained in the following recommendations.

- Incorporate biological effects-based criteria into the *Lakefilling Guidelines* as they develop, in order to complement the current chemical criteria, thereby maximizing the protection of lakes and other surface waters. The *Lakefilling Guidelines* also should address the compatibility of the chemical composition and other geochemical and biogeochemical characteristics of the fill material with those of the receiving body. If potential fill material fails on the basis of chemical or effects-based criteria, it should not be used; clean fill should be obtained from other sources, or lakefilling should not be done.

- Review detailed submissions by the public referring to analytical methodology (Appendix II) and encourage laboratories to take steps towards the institution of formal quality management practices.

- Monitor and assess the economic implications of the *Lakefilling Guidelines* on an ongoing basis.

- Implement and further develop the stated criteria for materials used to retain Confined Lakefill.

- Provide an interim publication that outlines the lakefilling approval procedures, as well as listing other jurisdictional mandates that require approval, until such time as the provincial lakefill policy is complete.

Note:. ACES' recommendations on the Materials Management Policy *component of the consultation are contained in the companion document* ACES' Recommendations on Proposed Policy for Management of Excess Soil, Rock and Like Materials. *In view of the strong link between the two documents, the reader may find it of value to treat them as complementary.*

REFERRAL

On March 25, 1992, ACES was asked by the office of the Minister of the Environment to undertake a technical review of the *Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario* (hereafter referred to as the "*Sediment Quality Guidelines*") and the *Fill Quality Guidelines for Lakefilling in Ontario: Application of Sediment and Water Quality Guidelines to Lakefilling* (hereafter referred to as the "*Lakefilling Guidelines*"). On June 4, 1992, the Minister of the Environment, Ruth Grier, requested that ACES conduct a public consultation on the *Lakefilling Guidelines*, and on July 12, 1992, made the same request for the *Proposed Policy for Management of Excess Soil, Rock and Like Materials* (hereafter referred to as the "*Materials Management Policy*"). The decision was made to consult on both documents simultaneously due to the interrelationships inherent in the disposal of excess material on land and in the water.

INTERNAL REVIEW PROCESS

Upon receipt of the *Lakefilling Guidelines* from the Ministry, ACES undertook its own internal review to determine whether the documentation was adequate to frame an effective public consultation.

After several meetings with Ministry staff, and some revisions to the documentation for purposes of clarification, ACES determined that the documentation was adequate to proceed with the consultation.

PUBLIC CONSULTATION PROCESS

The original ACES mailing list had been compiled from several mailing lists provided by the Ministry of the Environment. Other groups, who were thought to have an interest in the *Lakefilling Guidelines* and/or *Materials Management Policy,* were added to the list. The final mailing list included the following groups: industry, environmental organizations, labour unions, medical officers of health, municipalities, major aboriginal associations, Conservation Authorities, Remedial Action Plan Public Advisory Committees, landfill site operators, construction groups, other ministries and people who had requested information on N-Nitrosodimethylamine (ACES' previous consultation).

A package of background material was prepared and included:

- a letter outlining the consultation program
- two brochures about ACES
- Backgrounders on the *Lakefilling Guidelines* and the *Materials Management Policy* and a list of consultation topics

- a Backgrounder on the *Sediment Quality Guidelines* (these guidelines are important for understanding the relationship between the *Lakefilling Guidelines* and the *Materials Management Policy*)
- a flow chart showing how the two sets of *Guidelines* and the *Policy* relate
- an order form for technical documents available from the ACES Office
- a list of reference documents and addresses where the additional documents were available for viewing
- information about Deputation Meetings and Information Sessions
- an excerpt from a speech given by the Minister at the 39th Ontario Conference on the Environment (this was included to provide context for the *Lakefilling Guidelines* in relation to other initiatives of the Ministry)
- a postage paid return envelope

This package was sent to approximately 5,700 people between September 9, 1992 and September 11, 1992.

In order to reach other potentially interested people who might not be on the mailing list, an advertisement appeared in each of 25 newspapers across the province during the week of September 8th, 1992 and also in the Ontario Gazette on September 12, 1992.

As well, public Information Sessions and Deputation Meetings were advertised. An advertisement specifying the time and location of each Deputation Meeting appeared in one or more local newspapers prior to each meeting.

A total of 54 requests for public Information Sessions was received. Thirty-six of these specified Toronto as a preferred location. Two Information Sessions (afternoon and evening) were held at 250 Davisville in Toronto on October 14, 1992. ACES chaired the meetings and explained the ACES consultation program. Ministry of the Environment and Energy (MOEE) staff gave presentations on the *Lakefilling Guidelines* and the *Materials Management Policy* and answered questions from the audience. Approximately 45 people attended the afternoon session and about 20 attended the evening session.

Deputation Meetings were held in six cities across the province from October 28 to December 2, 1992. ACES members went to Thunder Bay, Toronto, Sudbury, Kingston, London and Hamilton to hear the public present its views. A total of 27 presenters appeared before ACES.

A total of 915 requests for ACES consultation materials and/or technical documents was received. Comments on the *Lakefilling Guidelines* and the *Materials Management Policy* were received from 110 individuals and groups. Twenty-nine commented on the *Lakefilling Guidelines*. A list of respondents is provided as Appendix III.

RESULTS OF PUBLIC CONSULTATION

In reviewing the comments presented at the Deputation Meetings and the written material submitted, every response was considered carefully by ACES. Their contents ranged from very brief comments to detailed technical submissions.

A number of general issues were identified in the course of reviewing the comments submitted. These are summarized in Appendix I. Many respondents addressed more than one issue.

The issues were categorized and are discussed as follows:

1.0 Support for the *Lakefilling Guidelines*
2.0 Classification Criteria
    2.1 ACES' Understanding of the Criteria
    2.2 General Approach
    2.3 Unconfined Fill
    2.4 Confined Fill
3.0 Sampling and Testing Requirements/Analytical Procedures/Exceedences
4.0 Integration with Other Policies/Jurisdictions
5.0 Economic Implications/Availability of Material
6.0 Other Concerns
7.0 Clarification of Text

1.0 Support for the *Lakefilling Guidelines*

Numerous respondents, including Environment Canada and the Waterfront Regeneration Trust, expressed support for the Ministry's initiative to develop guidelines to regulate lakefilling. Some mentioned that the proposed *Lakefilling Guidelines* were a marked improvement over the *Open Water Disposal Guidelines*, and an important step in improving the quality of Ontario's lakes. The Ministry was commended for its effort to integrate the *Lakefilling Guidelines* with the *Sediment Quality Guidelines* and the *Materials Management Policy*. Although there was widespread general support for the *Lakefilling Guidelines*, several aspects elicited public concern.

2.0 Classification Criteria

2.1 ACES' Understanding of the Classification Criteria

To be eligible as lakefill, whether confined or unconfined, material must be rated as Inert Fill under the *Materials Management Policy*. Criteria for Inert Fill are based on the 98th percentile of background concentrations of inorganic and organic contaminants in undisturbed, rural parkland surface soils. Inert Fill is therefore defined as material whose chemical constituents have concentrations at or below rural background levels.

For a material to be eligible as unconfined lakefill, its organic compounds must EITHER meet the No Effect Level of the *Sediment Quality Guidelines*, OR (and only if the ambient sediment concentration is above the No Effect Level) the Lowest Effect Level of the *Sediment Quality Guidelines*. For metals, material must meet EITHER the Lowest Effect Level OR the lower of "background" or "ambient" levels. All of the above criteria are based on chemical analysis of the candidate material. Although the *Sediment Quality Guidelines* employ the biological effects-based Screening Level Concentration approach to determine the Lowest Effect Levels, there is no direct biological effects testing of candidate materials in the *Lakefilling Guidelines*, creating a risk that toxicity resulting from synergistic interactions of contaminants might go undetected.

2.2 General Approach

A few respondents did not agree with the use in the *Lakefilling Guidelines* of chemical testing as a first step in evaluating fill or sediment quality. Concern was expressed that guidelines based on chemical testing focus on the potential fill's chemical impurity rather than on its effect on the aquatic environment. Environment Canada is concerned that the *Lakefilling Guidelines* do not require biological testing until a chemical guideline has been exceeded, and expresses its preference for the approach recommended by the International Joint

Commission[1], which emphasizes biological assessment first, with chemical testing being supportive and diagnostic.[2] Environment Canada has adopted the recommendations of the IJC, and is working towards the development of a set of effects-based sediment guidelines for the Great Lakes. These are expected to be ready by 1994-1995.

The Waterfront Regeneration Trust recommends an approach emphasizing the outcome or effect of fill material on the aquatic environment. The Trust feels that by using a chemical-based approach, the *Lakefilling Guidelines* concentrate on the degree of chemical impurity of potential fill rather than on its environmental impact.

Response by ACES

ACES discussed the merits of using effects-based vs. chemical-based guidelines. Some difficulty was perceived in employing a full set of effects-based criteria, as outlined in the IJC document, for lakefill materials of terrestrial origin. The IJC document is oriented towards the assessment of the quality of *in situ* lake sediments, and many of the criteria used, such as aberrant macrozoobenthic community structure and the presence of tumours or of high levels of metals or organics in fish, would clearly be unsuitable for most lakefill materials. It is, however, understood that MOEE is keeping in touch with the development of the Environment Canada guidelines, and it is assumed that the intent is to select criteria that are suitable for direct use, and to modify others. ACES agreed that both biological effects-based criteria and chemical-based criteria should be used in determining guidelines that maximize the protection of lakes and other surface waters.

ACES understands that Remedial Action Plans may use a combination of effects-based and chemical-based criteria.

ACES felt that, if the chemical composition and other geochemical and biogeochemical characteristics of the receiving body and of the fill material were different, their interaction could influence the potential toxicity of the system.

Recommendation

- ACES recommends that MOEE should incorporate biological effects-based criteria into the *Lakefilling Guidelines* as they develop, in order to complement the current chemical criteria, thereby maximizing the protection of lakes and other surface waters. The *Lakefilling*

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[1] IJC, 1988. *Procedures for the Assessment of Contaminated Sediment Problems in the Great Lakes.* Report to the Great Lakes Water Quality Board by the Sediment Subcommittee and its Assessment Work Group. IJC, December, 1988. 140 pp.

[2] Criteria recommended by the IJC report include macrozoobenthic community structure, external abnormalities and the presence of liver tumours in fish, concentrations of hazardous persistent organics and metals in fish or benthos, a battery of selected bioassay methods and concentrations of metals in surficial sediments above background.

Guidelines should also address the compatibility of the chemical composition and other geochemical and biogeochemical characteristics of the fill material with those of the receiving body.

2.3 Unconfined Fill

Comments were received in support of the classification system that divided material for lakefilling into two categories - Confined Fill and Unconfined Fill. Those who responded to this issue agreed that fill that would be deposited in open water required stricter guidelines than fill that would be placed in a confined area.

While some respondents supported the figures in the *Lakefilling Guidelines*, others felt that they were too stringent. Concern was expressed that implementation of the *Lakefilling Guidelines* could severely limit the availability of fill material for waterfront projects, particularly in the Toronto area. It was mentioned that much of the material that previously qualified for open water disposal would be rejected under the new guidelines. Concern was expressed that regional differences in background levels had not been considered. It was mentioned that metals in many of Ontario's lakes outside the Great Lakes basin exceed the Severe Effect Level. It was suggested that the *Lakefilling Guidelines* should take into account naturally occurring levels in native soils.

Other respondents questioned whether the *Lakefilling Guidelines* would provide adequate protection. Concern was expressed that adding Lowest Effect Level fill to Lowest Effect Level sediment might increase the level of a particular contaminant. Concern was expressed that if most major decisions are made on the basis of the Lowest Effect Level, then bioaccumulation is not taken into account.

One respondent tested City of Toronto soils with no suspected direct source of contaminants for certain inorganic parameters, and found that most exceeded the Lowest Effect Levels, but that very few exceeded the background (pre-colonial) levels. He therefore felt that he could support the *Lakefilling Guidelines* in allowing open water disposal for materials passing the latter criterion.

It was suggested that pesticides should be added to the Interim Guidelines list for materials of agricultural origin.

A number of respondents voiced concerns related to the volume of fill. How would the *Lakefilling Guidelines* affect users of small quantities of fill? Would the cumulative effects of multiple small projects be considered?

Response by ACES

ACES noted the role played by the Receiving Water Simulation test as a safeguard for materials that qualify as Unconfined Fill *via* the Lowest Effect Level, Background Level or

Ambient Level route.

ACES feels that the protection of lakes is the primary consideration. Criteria should not be adjusted for the purpose of making more material available for lakefilling.

Recommendation

- ACES recommends that potential fill material that fails on the basis of chemical or effects-based criteria should not be used. Clean fill should be obtained from other sources, or lakefilling should not be done.

2.4 Confined Fill

Some respondents questioned whether the Lowest Effect Level can provide adequate protection, even in the case of confined fill, since there may be leaching into the surface and ground water. It was suggested that only No Effect Level fill be used for confined fill.

A few respondents commented that the *Lakefilling Guidelines* should include design requirements for confining structures including engineering criteria, acceptable construction materials, life expectancy of the structure and site conditions, as well as risk assessment.

Response by ACES

ACES discussed these issues, and found that a valid area of concern was the material used in confining fill, although allowable materials are listed in Appendix C-1 of the *Lakefilling Guidelines*. It was felt that some new materials could also leach contaminants, suggesting that it is important to specify what materials may or may not be used in the water.

Recommendation

- ACES recommends that MOEE implement and further develop the criteria described in Appendix C of the *Lakefilling Guidelines* under General Conditions Governing Fill Placement for materials used to retain Confined Fill.

3.0 Sampling and Testing Requirements/Analytical Procedures/Exceedences

Clarification was requested. A number of respondents felt that sampling requirements and analytical procedures for laboratories to follow should be explicitly stated. Respondents specifically asked for clarification of the following areas: frequency and procedure for obtaining samples, procedures for sample preparation and chemical analysis, protocols for testing ambient sediment quality at proposed lakefill sites and the acceptability and testing requirements for rubble (brick and concrete), debris, and asphalt. Concern was expressed over the one-exceedence rule and it was suggested that averaging and statistical analyses should be used. One respondent suggested, for confined areas, allowing exceedences for substances of low toxicity, possibly up to the urban residential fill levels. The question was raised whether laboratories performing these analyses would need to register with MOEE.

Response by ACES

Since the first step in using the *Lakefilling Guidelines* is to determine whether material meets the Inert Fill criteria, the implementation of the *Lakefilling Guidelines* hinges on the accuracy of correctly classifying material based on the degree of contamination. It is imperative that a statistically valid sampling methodology and test for comparing values against the standard be developed, since this forms the basis on which all decisions regarding classification will be made. The test that determines exceedances must take into account the variability inherent in the classification criteria, as well as the variability to be expected in the characterization of the material to be used as lakefill, both by the process of sampling and the process of analysis (for example, the ability of the lab to accurately determine the analytes and the reproducibility of results among labs). This question is discussed extensively in Section 2.0 of *ACES' Recommendation* on *Materials Management Policy*, which should be read in conjunction with this document. The *Policy* document makes specific recommendations with respect to:

The development of a statistically valid sampling methodology
The development of a statistically valid test for comparing values against the stated criteria
The rationale for the classification criteria used (Ontario Typical Range, Method Detection Limit or biological effects)
The development of risk based criteria for commonly found substances
The length of the mandatory chemical test list
The development of site specific criteria
The development of customized sample extraction methodologies to reflect the environmental hazards inherent in particular environments

ACES discussed the importance of quality management for laboratories. Although MOEE will not certify laboratories, MOEE recommends that laboratories participate in a quality management process. ACES felt that MOEE should take an active role in encouraging this process.

Recommendation

- ACES recommends that MOEE review the detailed submissions referring to analytical methodology (Appendix II).

- ACES recommends that MOEE take steps towards the institution of formal quality management practices.

4.0 Integration with Other Policies/Jurisdictions

A number of respondents voiced concerns involving the inconsistencies and potential conflicts among the policies and requirements of different jurisdictions regarding lakefilling.

Different agencies use different criteria to evaluate sediments or materials placed in water bodies. The *Lakefilling Guidelines* use chemical testing as a first step in evaluating fill or sediment quality. This approach is different from the biological effects-based approach recommended by the International Joint Commission or from the "outcome" approach recommended by the Waterfront Regeneration Trust (see 2.2).

One municipality that had received permission from several ministries and a Conservation Authority to allow a bridge to fall as rip rap was concerned that the bridge might require removal under the *Lakefilling Guidelines*, adding to the cost of the project.

One respondent expressed concern that the *Lakefilling Guidelines* contradict the Great Lakes St. Lawrence Flood and Erosion Policy Statement, due to the *Guidelines*' inadequate design criteria for confining structures. Another respondent mentioned that MOEE staff had agreed to change this requirement to agree with the Ministry of Natural Resources policy.

Environment Canada was concerned that reference be made to mandates and regulations of other government agencies at the federal, provincial and municipal levels that have significant impacts on lakefilling. The Waterfront Regeneration Trust is preparing documents that address the "when and where" of lakefilling, and recommend that this be mentioned in the *Lakefilling Guidelines*.

Response by ACES

ACES notes the reference in the Foreword of the *Lakefilling Guidelines* to the fact that MOEE is currently developing a provincial lakefilling policy to address many issues. Also, Appendix C of the *Lakefilling Guidelines* raises the question of relationships with other jurisdictions. Thus, it appears that MOEE is aware of the need for integration with other policies and jurisdictions.

Recommendation

- ACES recommends that MOEE provide an interim publication that outlines the lakefilling approval procedures, as well as listing other jurisdictional mandates that require approval, until such time as the provincial lakefill policy is complete.

5.0 Economic Implications / Availability of Material

There was considerable concern that implementation of the *Lakefilling Guidelines* would increase costs for several reasons: the availability of suitable fill material for waterfront projects, particularly in the Toronto area, could be severely limited; much of the material previously accepted for open water disposal would no longer qualify, so that the supply would not meet the demand and prices would rise, and Inert Fill would have to be transported from more distant areas, increasing transportation costs; it would increase dredgeate disposal costs; disposal on land of material previously lakefilled would increase disposal costs. Increased costs would also be associated with testing, storing and rehandling materials for a "defined calm period", and rehandling fill materials now stockpiled.

Response by ACES

Since no economic analysis has been done, ACES does not feel qualified to fully assess the economic implications of implementing the *Lakefilling Guidelines*.

Recommendation

- ACES recommends that MOEE monitor and assess the economic implications of the *Lakefilling Guidelines* on an ongoing basis.

6.0 Other Concerns

Other questions were raised. Would the *Lakefilling Guidelines* discourage a project developer from on-site remediation? Are the *Lakefilling Guidelines* equally applicable to all areas of the province? Might the exemption for "emergency shoreline works" be subject to abuse?

7.0 Clarification of Text

Several respondents commented that text in the document needed simplification or clarification, particularly the requirements for Confined and Unconfined Fill, the guidelines for unconfined disposal, "Siting and Design Considerations", definition of "large scale", and definition of "adequately stabilized" in regard to projects exempt from the *Lakefilling Guidelines*.

Response by ACES

AGES discussed this issue and agreed that while there were some areas that could use further clarification, the *Lakefilling Guidelines* were generally straightforward. ACES suggests that MOEE emphasize the paragraph in the Foreword that deals with the proposed provincial lakefill policy. Attention should also be drawn to the application procedure strategy outlined in Appendix C of the *Lakefilling Guidelines*, but at the same time emphasizing the fact that it is an interim strategy. It is also suggested that the penultimate paragraph on page 3 be amended to read "......contact with open water, **pending appropriate approvals from other agencies**". ACES also suggests that Table 2 include Lowest Effect Levels for comparison with Background Levels of metals.

Summary of Recommendations

ACES recommends that MOEE:

- Proceed with the implementation of the *Lakefilling Guidelines*, taking into account the provisos contained in the following recommendations.

- Incorporate biological effects-based criteria into the *Lakefilling Guidelines* as they develop, in order to complement the current chemical criteria, thereby maximizing the protection of lakes and other surface waters. The *Lakefilling Guidelines* should also address the compatibility of the chemical composition and other geochemical and biogeochemical characteristics of the fill material with those of the receiving body. If potential fill material fails on the basis of chemical or effects-based criteria, it should not be used; clean fill should be obtained from other sources, or lakefilling should not be done.

- Review detailed submissions by the public referring to analytical methodology (Appendix II), and encourage laboratories to take steps towards the institution of formal quality management practices.

- Monitor and assess the economic implications of the *Lakefilling Guidelines* on an ongoing basis.

- Implement and further develop the stated criteria for materials used to retain Confined Lakefill.

- Provide an interim publication that outlines the lakefilling approval procedures, as well as listing other jurisdictional mandates that require approval, until such time as the provincial lakefill policy is complete.

APPENDIX I

LAKEFILLING GUIDELINES

SUMMARY OF PUBLIC COMMENTS

1.0 SUPPORT FOR LAKEFILLING GUIDELINES i

2.0 CLASSIFICATION CRITERIA

  2.2 GENERAL APPROACH iii

  2.3 UNCONFINED FILL iv

  2.4 CONFINED FILL vi

3.0 SAMPLING AND TESTING REQUIREMENTS/ ANALYTICAL PROCEDURES/EXCEEDENCES vii

4.0 INTEGRATION WITH OTHER POLICIES/JURISDICTIONS ix

5.0 ECONOMIC IMPLICATIONS/AVAILABILITY OF MATERIAL xi

6.0 OTHER CONCERNS xii

7.0 CLARIFICATION OF TEXT xiii

1.0 Support for Lakefilling Guidelines

Peter Hare PAC Co-Chair, Metro Toronto and Region Public Advisory Committee	- strongly support this initiative because they see improved lakefill guidelines as an important step to stopping further deterioration of our lakes.
Beth Oosthuzien Administrator/Clerk, Municipality of the Township of Tiny Perkinsfield	- advises that Council of the Township of Tiny has passed a resolution approving "the preliminary report of ACES re: Management of Excess Soil, Rock and Fill Quality Guidelines".
N.L Embree Commissioner of Environmental Services, Regional Municipality of York, Newmarket	- pleased that an overall policy is being developed combining fill and sediments. Rating system is simple and straightforward and based on science.
C. Whiting, Medical Officer of Health, Chief Executive Officer, North Bay & District Health Unit	- pleased to see ongoing efforts to reduce environmental contamination and improve the quality of life.
R.G. Aldi, Manager, Hiram Walker & Sons Ltd. Windsor	- concurs with the Guidelines presented for classification and ultimate uses of the materials, particularly lakefilling. -this guidance will be invaluable to the RAPs
A.J. Anderson, Director, Public Health Inspection, Regional Municipality of York Newmarket	- York Region Public Health Department supports initiatives. This will go a long way in improving the quality of lakes. This will result in improvement of drinking and recreational water quality and provide contaminant-free environment for aquatic life.
Individual	- overall finds the policy and rationale for implementation acceptable.
Ruby Rogers Little Cataraqui Environmental Association, Kingston	- commends Ministry on excellent work
Bonny Harrison, Deputy Clerk, The Corporation of the City of North Bay, North Bay	- City supports the principles of protecting natural water bodies as outlined.

Wayne deVeau Director of Community Services, The Corporation of the Town of Cobourg, Cobourg	- Town endorses the paper, it is well done and very specific providing clarification for their future harbour needs.
C.W. Lundy, Regional Clerk, The Regional Municipality of Durham, Whitby	- combining of guidelines on sediment quality and lakefill quality is beneficial for simplification, flexibility and a wider scope in dealing with future issues.
Michael Harrison, President, Citizens Concerned about the Future of the Etobicoke Waterfront, Etobicoke	- endorse the stricter guidelines which are a vast improvement over the old ones.
Simon Llewellyn Regional Director, Environmental Protection, Ontario Region, Environment Canada, *Coordinated Environment Canada review of project*	-marked improvement over the Open Water Disposal Guidelines. Environment Canada recognizes the initiative and considerable efforts of the Ministry of the Environment in the development of these guidelines.
Suzanne Barrett Director of Environmental Studies, Waterfront Regeneration Trust, Toronto	-represent a comprehensive and integrated approach to protection of aquatic ecosystems from the adverse effects potentially associated with lakefilling. The Waterfront Regeneration Trust supports the effort to draft these much needed guidelines.

2.2 Classification Criteria - General Approach

Simon Llewellyn Regional Director, Environmental Protection, Ontario Region, Environment Canada, *Coordinated Environment Canada review of project*	- The proposed guidelines do not fully address the chemical, physical and biological factors associated with sediments. Our greatest difficulty with the MOEE guidelines lies in the structural organization of the guideline development procedure, in that biological testing is not considered until a chemical guideline has been exceeded. Environment Canada is preparing biologically-based guidelines for Great Lakes sediment. This is preferred because it can quantify the environmental impact. These will be ready in 94/95 but Environment Canada is willing to accept on an interim basis the MOEE guidelines in assessment of dredge and lakefill proposals and clean-up of contaminated sediment in areas of federal concern.
Suzanne Barrett Director of Environmental Studies, Waterfront Regeneration Trust, Toronto	- Regeneration Report of the Royal Commission on the Future of the Toronto Waterfront recommended that contaminant levels be set so that aquatic ecosystems are protected. This "outcome" approach considers how the ecosystem will be affected, while with the "input" approach the emphasis is on the degree of impurity. It appears that the material for lakefill first has to meet the Inert Fill guidelines as defined by the MMP which is based on OTR but does not consider its effect on the aquatic environment.
R.G. Aldi, Manager, Hiram Walker & Sons Ltd. Windsor	- in reference to "majority" of sediment-dwelling organisms suggests to him that not all organisms are beneficial. He prefers to view all bottom-dwellers as beneficial.
Ann Borooah, Director Housing Advocacy and Planning Branch Ministry of Housing Toronto	The Lakefilling Guidelines appear to be premised on addressing a potential problem rather than an actual problem and this raises the question of why such severe restrictions are being imposed on lake filling. For example, on page 5, the Guidelines state "neither acute nor chronic biological effects have been documented...in the vicinity of lake fills, the PWQOs/PWQGs are not routinely violated but are occasionally exceeded...it is often difficult to separate the effects of lakefilling from other point and non-point sources of contaminants." Given concerns about the need to encourage more compact development patterns, it is worth pointing out that policies based on perceived problems or remediation of contaminated soils to near perfect condition can discourage intensification because of the costs they impose.

2.3 Classification Criteria - Unconfined Fill

Suzanne Barrett Director of Environmental Studies Waterfront Regeneration Trust Toronto	- list of parameters is comprehensive and reflects the known threats to the environment. - guidelines may be too stringent, particularly in Toronto where sufficient protection may be obtained from material designated as urban residential. - recommend reviewing the sampling requirements, particularly for native and homogenous materials. -the cumulative impact of numerous "small" projects, whether clustered or spread out along the waterfront, should not be overlooked. - the Interim Guidelines List notes that residential and agricultural soils considered for unconfined fill should be tested for PCBs, Total Organic Carbon and Total Phosphorus. Suggest adding pesticides which may be present in agricultural soils.
J. Craig Mather Chief Administrative Officer The Metro Toronto and Region Conservation Authority, Downsview	- support the screening and classification system but recommend that MOEE review the strict interpretation and allow averaging of results and use other statistical analysis across soil strata. - agree that broken asphalt is not suitable for open water disposal. - guidelines for certain materials have been lowered significantly and should be reviewed to account for naturally occurring levels in native material in Toronto area.
Individual	- draws on information and data from the Toronto Harbour Commission. The Leslie Street Spit landfill will continue to operate under the MTRCA by bill of lading. The site only accepts fine material that passes the Open Water Disposal Guidelines. Cites the Royal Commission's Report "Shoreline Regeneration for the Greater Toronto Bioregion" that states that 50% of material that qualified for open water disposal in 1990 would be rejected under the new guidelines.
N. Vardin City Engineer and Commissioner City of Toronto Department of Public Works and the Environment	- provides data from native soil collected in Toronto over last 2 years. Most exceed the LEL as defined in Appendix A for total P, Cu, TKN, Cr, Fe or Ni. Only a minimal number exceed the pre-colonial Great Lakes sediment horizon background levels (cf. Table 2), therefore agrees that unconfined fill be above LEL but below background or ambient levels. - based on the number of samples in Toronto that exceed LEL for TP and TKN, precolonial background sediment levels should be provided. The "ambient" levels along Toronto waterfront would be influenced by past contamination.
Simon Llewellyn Regional Director Environmental Protection Ontario Region, Environment Canada *Coordinated Environment Canada review of project*	- concern that if most management decisions are made at the Lowest Effect Level then bioaccumulation is not taken into account. - regional differences in background levels are not considered, for instance levels for metals in many of Ontario's 20,000 lakes exceed the SEL which will result in an increased cost burden to the Department of Transport who are responsible for maintaining navigable waters. This in fact may be considered but the details of implementation are lacking in the document. - LEL is sometimes higher than the background level. Example, Cd at 0.6 μg/g has an effect on biota but 1.1 μg/g is given as the LEL because it is the background level.

Walter Brown Walter Brown Associates, Mississauga	Historically, foundry sand was disposed of in a pit at Leslie St. Spit. Demolition material was dumped as well. Suggests that demolition material should be crushed and reused on site if possible. -Keating Channel material (lot of organic material) was disposed of in 50 feet of water. Recommends that it should be discharged into a confined area and the sludge incinerated. Guidelines are useful, but need Regulations.
Jan Samis Public Advisory Committee, Bay of Quinte Remedial Action Plan, Newburgh	- concern that adding LEL fill to LEL sediment may increase the level of a particular contaminant or create a different one. Presumably intent is to use natural background levels as base.
N.L. Embree Commissioner of Environmental Services, Regional Municipality of York, Newmarket	- volume of lakefill to be placed in an area should also be considered in the guidelines.
Ruby Rogers Little Cataraqui Environmental Association, Kingston	- wonders whether enforcement is possible for individuals who wish to shore up small area in front of cottage.
E. J. Coates, City Engineer Public Works Department, City of Nanticoke, Jarvis	- raises concerns about testing requirements. Concerned that chemical and sedimentation testing will be required for the few surplus loads of municipal fill that are now used to back up armour stone protected areas. His report was adopted by City Council.
J.E. Cummins, Associate Professor, Department of Plant Sciences University of Western Ontario, London	- questions the setting of guidelines for VOCs which either float or sink and do not biomagnify but are set more stringently than the drinking water guidelines in contrast to PCBs, PAHs and pentachlorophenol which are set several magnitudes higher. - tris (4-chlorophenol) methanol, a pollutant from dyes and plastics should be added to the list since it biomagnifies and may be a "peroxisome proliferating carcinogen". Nitrilotriacetic acid, a breakdown product of non-phosphorus detergents, should also be added since it causes kidney cancer and gene damage.
Walter Sencza Noranda Minerals Inc. Manitouwadge	- asserts that recent work by Beak has shown that sediments are non toxic to sediment organisms with Zn 3 to 7 times higher than the SEL. Feels that proposed levels require careful scrutiny based on this research.

2.4 Classification Criteria - Confined Fill

Peter Hare PAC Co-Chair Metro Toronto and Region Public Advisory Committee	- concerned about contaminated soil in contained fill. How is this controlled? How much can we depend on the "Lowest Effect Level" as being safe?
Individual	- suggests there is potential for contaminated fill used as confined fill to leach or otherwise get into the water. Suggests that only No Effect Level fill be used near surface water.
Suzanne Barrett Director of Environmental Studies Waterfront Regeneration Trust, Toronto	- material to be used in confined fill should meet some terrestrial receptor based effects level since it is anticipated that the material will remain on land. - guidelines may be too stringent, particularly in Toronto where sufficient protection may be obtained from material designated as urban residential.
J. Craig Mather Chief Administrative Officer The Metro Toronto and Region Conservation Authority, Downsview	- prior to implementation, criteria need to be developed for constructing confined lakefill sites. - engineering criteria for confined fill sites should be included in the guidelines including material allowed to be used and materials to be used in protecting these structures.
John A. Gartner Commissioner of Planning, Metropolitan Planning Department, The Municipality of Metropolitan Toronto	-concurs with the Metropolitan Toronto and Region Conservation Authority comments on confined engineering criteria
Individual	- design requirements of the confining structure need to be more fully defined rather than just in terms of "significant wave action". Other parameters should include level of acceptable risk, life expectancy of the structure and site criteria.

3.0 Sampling and Testing Requirements/Analytical Procedures/Exceedences	
Individual	- new guidelines set out only fill quality criteria without details of implementation procedures. Also requirements of labs (registration with MOEE) is not clear. Frequency and procedure for obtaining samples needs to be clarified. - chemical analysis focuses on loose earth only while the guidelines cover any solid material.
S. Joseph, Senior Engineer Peto MacCallum Ltd. Toronto	- "Candidate materials will be tested by bulk chemical analysis ...". Procedures used for sample preparation and chemical analysis should be detailed in an Appendix. Exact documentation is required for labs to follow the same protocol and certified materials should be available from the parameter list so labs can quantify to the required degree of accuracy and be on a list of qualified laboratories.
J. Craig Mather Chief Administrative Officer The Metro Toronto and Region Conservation Authority Downsview	- prior to implementation, sampling protocols need to be developed for testing ambient sediment quality at proposed lakefill sites. - clarification is needed both as to when testing of rubble (brick and concrete) is necessary and on the interpretation of the results. -not practical to reject entire excavation sites because of one, or a few marginal exceedences...consider a more practical interpretation protocol that would utilize averaging of results and/or statistical analysis across like soil strata. *Full text is included in Appendix II*
Suzanne Barrett Director of Environmental Studies Waterfront Regeneration Trust Toronto	- list of parameters is comprehensive and reflects the known threats to the environment. - recommend reviewing the sampling requirements, particularly for native and homogenous materials. - concerned about the strict application of the 1 exceedence to disqualify material. Suggest the use of averaging and statistical analyses and do not feel that this will result in environmental degradation. Suggest that lists of allowable exceedences for substances of low toxicity be prepared, possibly allowing contamination up to the urban residential fill levels. - there are discrepancies between the inorganic parameter levels for Interim Guidelines and Table 3-1 of the MMP for Cr VI, Hg and Cd, with the MMP imposing stricter levels than the Interim List. This discrepancy should be resolved. *Full text is included in Appendix II*
E. J. Coates, City Engineer Public Works Department City of Nanticoke, Jarvis	- raises concerns about testing requirements. Concerned that chemical and sedimentation testing will be required for the few surplus loads of municipal fill that are now used to back up armour stone protected areas. His report was adopted by City Council.
J.E. Cummins, Associate Professor, Department of Plant Sciences, University of Western Ontario London	- values for PCBs should not be set by percent chlorine but for "coplanar isomers". - benzo(a)pyrene is an appropriate surrogate for analysis of PAHs which would serve as a "rapid inexpensive and highly accurate monoclonal (ELISA) analysis very well". *Full text is included in Appendix II*

Simon Llewellyn, Regional Director Environmental Protection, Ontario Region, Environment Canada *Coordinated Environment Canada review of project*	- no effect and LEL for organics are unrealistic. A guidance document on analytical methods needs to be appended to the document. Manual should also detail the number and types of samples as well as sediment handling procedures. - description of the 2 bioassays is inadequate. Is the sediment sieved? What is the recommended survival rate? How should species differences be interpreted? - in Fill Quality Guidelines document how was Table 1 derived? Why are pesticides and other organics excluded? *Full text is included in Appendix II*
James K. Poucher, President CleanSoils Inc., New Brighton, Minnesota, U.S.A.	-the concern should be related to leachable contaminants which pose a potential threat to the environment. Leachable VOCs are usually less than 10 percent of total levels.
Ann Borooah, Director Housing Advocacy and Planning Branch Ministry of Housing, Toronto	-in terms of measures to reduce turbidity during filling, it is unclear whether the contingency plan for violations must be prepared by the lakefilling operator or the development proponent. This should be clarified.

4.0 Integration with Other Policies/Jurisdictions

Individual	- there is a large gap in lead levels between MOEE's SEL of 250 ppm and the U.S. EPA's heavily polluted level of 60 ppm.
Ann Borooah, Director Housing Advocacy and Planning Branch, Ministry of Housing Toronto	The regulatory process governing lakefilling projects contains several, perhaps overlapping steps or mechanisms including the Environmental Assessment Act's requirements, the Lakes and Rivers Improvement Act, the federal Fisheries Act, MTRCA's guidelines and finally MOEE's policies and guidelines. While each step may have its unique requirements, it would be useful if some effort was made to rationalize the process as it relates to lakefilling in order to reduce duplication and clarify the process for proponents. -it is unclear how the Lakefilling Guidelines relate to the work currently underway within MNR to create a Great Lakes - St. Lawrence River Flood and Erosion Policy Statement. The Flood and Erosion Policy Statement states as one of its underlying premises that in some cases construction of protective works (lake filling) to prevent beach erosion is less acceptable than outright prevention of development. How are the two policies to be linked once they are in operation?
Simon Llewellyn Regional Director, Environmental Protection, Ontario Region, Environment Canada *Coordinated Environment Canada review of project*	- reference must be made to mandates of other jurisdictions. - feel that use of bulk background sediment chemistry as a first tier of classification is inconsistent with IJC recommendations which emphasize biological assessment first. Environment Canada is prepared to accept on an interim basis the Guidelines in assessment of dredge and lakefill and for sediment clean-up.
Suzanne Barrett Director of Environmental Studies, Waterfront Regeneration Trust, Toronto	- mention that MOEE staff have indicated that the confined fill structure requirement will be changed to withstand 100 year storm rather than the current 25 year storm. Regeneration Trust supports this change to consistency with MNR policy documents. - issues that the Trust expects to address include: adequacy of 15 m exposed fill face for projects of various sizes, whether the distance can be increased if other mitigative measures are used and whether this limit applies to soils and other easily entrained materials? - recommend that specific mention be made of the documents in preparation by the Trust to address "when and where" of lakefilling. Suggest that either Appendix C be removed and reference made to the Trust or Appendix C be retained as interim pending guidelines from Regeneration Trust.
D. Michael Lovejoy Regulations Officer, Lower Trent Region Conservation Authority, Trenton	- guidelines contradict the Great Lakes St. Lawrence River Flood and Erosion Policy Statement, particularly Sect. 2.2 and 2.3 of the Fill Quality Guidelines, the design criteria for confining structures are inadequate in that they only require protection to a 1:25 and 1:50 year wave and as fill sites will be subject to the great lakes Policy which requires elevation equal to the sum of 100 year monthly mean lake level plus the 100 year wind setup plus allowances for other water related hazards.

R.H. Skeoch, Clerk-Treasurer Council of Maryborough Township, Moorefield	- concerned that agreement with MTO, MNR, MOEE and Grand River Conservation Authority to allow detour of the Conestoga River and abandonment of one bridge by letting it fall as rip rap may be negated and that removal of the bridge will be required adding to the cost of the project. - there should be an exemption for municipalities.
E.J. Macklin Ontario's Challenge for HMS Nancy, Nancy Griffon Fund Inc. Scarborough	- refer to regenerative program at King's Harbour Marine Park to reconstitute the old harbour and land mass of Port Union. They plan to use berms and self-draining dykes which will be filled with dredged material from the site. They will also use inert fill, urban residential fill and urban industrial fill. They will be making presentations to Regeneration Trust. -suggest use of *The Manual for an Improved Lakefill Quality Control Program* as prepared by Trow Dames & Moore, published by MTRCA in 1988

5.0 Economic Implications/Availability of Material

Individual	- draws on information and data from the Toronto Harbour Commission. The Leslie Street Spit landfill will continue to operate under the MTRCA by bill of lading. The site only accepts fine material that passes the Open Water Disposal Guidelines. Cites the Royal Commission's Report "Shoreline Regeneration for the Greater Toronto Bioregion" that states that 50% of material that qualified for open water disposal in 1990 would be rejected under the new guidelines. - costs will increase because of receiving water simulation method and turbidity test. Restricting lakefill to a "defined calm period" will require backup for storing and rehandling of the material.
Suzanne Barrett Director of Environmental Studies, Waterfront Regeneration Trust, Toronto	- concern about availability of appropriate fill material, in terms of alternate disposal sites being needed for material previously used for lakefill as well as increased costs of transportation. - concerns that the availability of lakefill material will not be sufficient to meet demand. - guidelines may be too stringent, particularly in Toronto where sufficient protection may be obtained from material designated as urban residential.
J. Craig Mather Chief Administrative Officer, The Metro Toronto and Region Conservation Authority, Downsview	- strict implementation of the chemical test results would severely limit availability of material for future lakefill projects along the Waterfront. - implementation will have significant cost implications on Authority projects along Metro Toronto Waterfront due to "contaminated" native material that would not qualify for open water fill. These include Etobicoke Motel Strip Public Amenity Scheme and the East Point project in Scarborough.
N. Vardin City Engineer and Commissioner, City of Toronto Department of Public Works and the Environment	-there will be an increase in testing costs, suggest "grandfathering" decommissioning or lakefill guidelines for sites already sufficiently tested.
Ann Borooah, Director Housing Advocacy and Planning Branch Ministry of Housing Toronto	-if less material is allowed to be placed in lakefilling projects, it would mean higher costs to developers if the fill is required to be placed elsewhere. It could also mean a reduction in the number of sites which can be developed at a reasonable cost in built-up areas well-suited for residential development -recommend that MOEE monitor the economic impacts of the proposal over time to determine its costs and benefits. We also urge MOEE to examine and report on whether the Lakefilling Guidelines will result in significantly less excess materials being available for lakefilling.

6.0 Other Concerns

Ann Borooah, Director Housing Advocacy and Planning Branch Ministry of Housing, Toronto	In situations where a project (possibly with a residential component) is being developed on a waterfront site which has some soil contamination, would the Lakefilling Guidelines preclude the project developer from performing the necessary remediation on-site and returning the "cleaned" soils to the site (e.g., as confined fill)?
E. J. Coates, City Engineer, Public Works Department City of Nanticoke, Jarvis	- questions whether what is good for the GTA is good for Nanticoke.
Suzanne Barrett Director of Environmental Studies, Waterfront Regeneration Trust, Toronto	- what is an emergency shoreline work that will be exempt from the policy? This may be subject to abuse.
J.E. Cummins, Associate Professor, Department of Plant Sciences, University of Western Ontario, London	- proposals fail to cope with the surface microlayer concept. Airborne hydrophobic pollutants including PCBs, dioxins, PAHs and heavy metals concentrate on the surface and damage the surface feeding layer. Impact of polluted sediment on the microlayer needs to be studied.

7.0 Clarification of Text

N. Vardin City Engineer and Commissioner City of Toronto Department of Public Works and the Environment	- guidelines for unconfined disposal are difficult to interpret, suggests clarifying or simplifying them.
Suzanne Barrett Director of Environmental Studies, Waterfront Regeneration Trust, Toronto	- text is complex and requires simplification, particularly Sect.2.2.1 and 2.2.2 which set out the requirements for Confined and Unconfined fill. It is not clear which are guiding principles and which are requirements. - clarification must be provided that Regional Director is MOEE and not MNR. - support the goals in the Siting and Design Considerations but feel that there should be more explanation. In particular, suggest that occasionally the creation of embankment areas may be desirable such as for developing wetland areas. - recommend that a clearer definition of "large scale" in terms of applicability of the policy be provided. Also suggest that all large scale projects, not just for recreational use be subject to the guidelines. - guidelines exempt 1) material placed on shorelands above the high water mark and adequately stabilized and 2) material placed behind impermeable barriers. Much more detail needs to be provided on whether stabilization includes engineered works to prevent leachate migration and whether monitoring will be required.
Individual	- suggestions for clarification of Figures and typo Sect 2.2.1 Confined Fill Material Criteria, first paragraph "sediments" should be "rock".
S. Joseph Senior Engineer, Peto MacCallum Ltd., Toronto	Appendix B: - sodium absorption ratio should be changed to sodium adsorption ratio. - µg/g is not an SI unit mg/kg should be used. - correct units for electrical conductivity, sodium adsorption ratio and pH should be used.

APPENDIX II

DETAILED SUBMISSIONS REFERRING TO ANALYTICAL METHODOLOGY

Suzanne Barrett, Director of Environmental Studies
Waterfront Regeneration Trust

Joseph E. Cummins, Associate Professor
University of Western Ontario

S. Llewellyn, Regional Director
Environment Canada

J. Craig Mather, Chief Administrative Officer
The Metropolitan Toronto and Region Conservation Authority

Waterfront Regeneration
Trust

Ontario

Fiducie de régeneration du
secteur riverain

Commissioner
The Honourable David Crombie, P.C.

Deputy Commissioner
David A. Carter

Commissaire
L'honorable David Crombie, p.c.

Sous-commissaire
David A. Carter

RECEIVED
MINISTRY OF THE ENVIRONMENT
FEB 4 1993
ADVISORY COMMITTEE
ON ENVIRONMENTAL STANDARDS

4 February 1993

Ms. Eva Kennedy
Scientific and Technical
Co-ordinator
Advisory Committee on
Environmental Standards
Ministry of the Environment
4 th Floor
40 St. Clair Avenue West
Toronto, Ontario
M4V 1M2

Dear Ms. ~~Kennedy~~: Eva

Re Review of MMP and Lakefill Quality Guidelines for ACES

Please find enclosed the Waterfront Regeneration Trust's review of the proposed Materials Management Policy and Lakefill Quality Guidelines for the consideration of the Advisory Committee on Environmental Standards (ACES). I would like to thank ACES for the opportunity to comment on the draft documents, and apologize for the delay in forwarding the Trust's comments to you.

The Materials Management Policy was reviewed by Trust staff, while the Lakefill Quality Guidelines was reviewed by the Lake Ontario Greenway Strategy's Shoreline Management Work Group.

The two documents represent a positive step in the direction of comprehensive, environmentally responsible management of excess materials. The comments enclosed are designed to promote further consideration of a number of issues which will be important to the successful implementation of the policies.

If you have any questions regarding the enclosed submissions or the work of the Trust, please do not hesitate to contact me at 314-9471.

Sincerely,

Suzanne Barrett

Suzanne Barrett
Director of Environmental Studies

207 Queen's Quay West, Ste. 580
Toronto, Ontario
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Review of the Proposed Fill Quality Guidelines for Lakefilling in Ontario

Waterfront Regeneration Trust February 1993

Overview

The proposed Fill Quality Guidelines for Lakefilling in Ontario (Lakefill Quality Guidelines), together with the proposed Policy for Management of Excess Soils, Sediments and Like Materials (Materials Management Policy or MMP) and the Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario (Sediment Quality Guidelines), represent a comprehensive and integrated approach to protection of aquatic ecosystems from the adverse effects potentially associated with lakefilling. The Waterfront Regeneration Trust supports the effort to draft these much needed guidelines, and encourages the initiative taken to ensure environmental protection while minimizing negative economic impacts.

The substance of the documents is addressed below under the headings recommended by ACES. The *primary* concerns of the Trust are as follows:

- The Lakefill Quality Guidelines and the two associated policies, the Materials Management Policy and the Sediment Quality Guidelines, are difficult texts. They require simplification.
- The Lakefill Quality Guidelines have used an "input" approach to screening lakefill, prohibiting material of a certain quality regardless of its likelihood of harming the environment. An "outcome" approach would eliminate or minimize environmental impacts yet would not be so stringent as to render lakefilling unfeasible.
- Using inert fill guidelines to screen lakefill material may be too stringent. Urban residential fill guidelines may be equally as effective. Alternatively, an effects-based measure may be more appropriate.
- Flexibility may be needed in handling guideline exceedances.
- The work of the Trust in collaboration with the MOE in developing guidelines which will address methods and locations of lakefilling should be acknowledged. The Physical Effects section and Appendix C should be noted as interim to forthcoming guidelines.

The Documents

In reviewing the three policies, Trust staff and the members of the Trust's Shoreline Management Work Group (part of the Lake Ontario Greenway Strategy) found the texts difficult to follow. Where the meaning of the text was unclear, the reviewers were left unsure of the principle being enunciated. All three policies will be referred to extensively by the consulting field, government, industry and other interested parties, and hence ,there should be no uncertainty as to the requirements being made of all affected parties.

An example of unclear text appears on the cover of the Lakefill Quality Guidelines itself. There are two titles, Fill Quality Guidelines for Lakefilling in Ontario and Application of Sediment and Water Quality Guidelines to Lakefilling. Which is the title? Is the latter a subtitle?

The most difficult sections of the Guidelines to comprehend are Sections 2.2.1 and 2.2.2, which set out the requirements for confined and unconfined fill. In these sections it not at all clear what are guiding principles and what are requirements. For example, four principles or criteria are listed by bullet points under the heading Unconfined Fill Material Criteria. Then, more requirements involving the Sediment Quality Guidelines are set out under the headings Site-Specific Suitability of Fill, Objectionable Substances, and Receiving Water Simulation. The first four criteria appear to be general principles which are expanded upon under the subsequent headings. Hence, the section is either repetitious or unclear in its structure. The two sections, and possibly Section 2 in general, should be re-written to clearly set out, point by point, what the requirements are.

Proposed Screening and Classification

Before material can be used as lakefill, it must meet the inert fill guidelines outlined in the proposed Materials Management Policy (interim guidelines have been included in the Lakefill Quality Guidelines). To be classified as inert fill, material must meet the Ontario Typical Range for Rural Parkland (OTR_{rural}), which represents background concentrations of inorganic and organic contaminants in undisturbed, rural parkland surface soils. According to the Lakefill Quality Guidelines, inert fill may be used as confined lakefill; to be disposed of in open water as unconfined fill, the material must meet more rigorous standards set out in the Guidelines.

A Results-Oriented Approach

In its final report, *Regeneration*, the Royal Commission on the Future of the Toronto Waterfront recommended,

> ...that the Province adopt new sediment guidelines for open-water disposal; these should reflect the latest scientific studies, and should establish contaminant limits at levels that will protect aquatic ecosystems. (Recommendation #29)

The recommendation made it clear that the goal driving guideline development should be protection of the ecosystem. The focus should be on the desired result -- minimization of ecosystem impacts through regulation of lakefilling activities. This may be termed an "outcome" goal. This position was favoured over what might be termed an "input" goal; for example, concentrating on eliminating use of all fill which might be contaminated in any way. Under the "input" approach, the emphasis is not on how the environment is affected, but on how impure the material is.

The "input" approach may be neither practical nor necessary. It is of no benefit to the environment if guidelines are developed which are more stringent than needed to prevent harm to the aquatic ecosystem from acute exposure, long-term exposure or cumulative effects. Such stringent guidelines may, however, drastically reduce the amount of material available for lakefilling, an activity which may be, under certain circumstances, practical and beneficial (eg. repair of existing structures, waterfront access and recreation, employment).

The Trust would support an effects-based classification system (an outcome approach) whereby the impact of the material on the aquatic environment is determined in order to classify the material as confined or unconfined fill. While it must be acknowledged that there is a lack of information about the effects associated with some chemicals, the Sediment Quality Guidelines indicate that there are effects-based guidelines available for contaminants in the aquatic environment. Despite the availability of effects-based information, the acceptability of material as lakefill is determined by the inert fill guidelines, which are based on measurements of background levels of contamination in terrestrial environments. Classifying material as inert fill (or as urban residential fill) indicates that the material is at or below provincially-averaged background levels, but does not indicate whether the material is harmful to the aquatic environment. Certainly, contaminant levels in inert and urban residential fill can be much higher than the Lowest Effect Level limit, meaning either fill type could affect some benthic organisms. According to the table entitled Guideline Levels and Their Significance in the Sediment Quality Guidelines, inert fill could be located anywhere on a continuum from clean (no impact on water quality, water uses, or benthic organisms) through marginally polluted (potential to affect some sensitive water uses) to significantly polluted (will affect sediment use by some benthic organisms). If inert fill was contaminated to its upper limit for every criterion, the fill would be positioned somewhere between the Lowest Effect Level and the Severe Effect Level.

Because chemical concentrations, rather than some measure of impact on aquatic organisms, are relied upon as a measure of fill suitability, the fact that material may meet inert fill specifications tells the proponent or any other party little about the effect of disposing of this material on the environment. According to the Guidelines, unconfined fill must meet effects-based guidelines. A consistent approach should be adopted, where some point on the No Effect - Lowest Effect - Severe Effect continuum is chosen as the upper limit acceptable for confined lakefill. Information on terrestrial environment receptors could also aid in determining the acceptable upper effects-based limit of confined and unconfined material, given that this material eventually supports some form of terrestrial ecosystem.

Screening

The inert fill criteria, and hence the confined fill criteria, are based on protection of the terrestrial environment, not the aquatic environment. Confined fill is to be deposited in structures which isolate the material from the open water, thereby creating new land which is not directly connected with the aquatic environment. Hence, as an initial screening level for material which will be essentially terrestrial, it is logical to use criteria which are based on protection of the terrestrial environment.

Much of the material in Southern Ontario made available as potential lakefill is generated by construction activity in urban areas. This is particularly true of the Greater Toronto Area, which generates the largest volume of waste material in Ontario. Much of the lakefilling in Southern Ontario occurs along the waterfront of urbanized areas. Given the urban origin of much of the material, and the urban destination of the material, it might be argued that, if an effects-based screen is not adopted, it would be sufficient to screen lakefill material using the urban residential fill criteria outlined in the MMP. These criteria are background-based like the inert fill criteria, but are based on the Ontario Typical Range for undisturbed, urban parkland surface soils (OTR_{urban}). Material meeting the OTR_{urban} can be deposited at urban residential and recreation sites. This suggests that material meeting the OTR_{urban} criteria would be safe enough to humans and the environment to use as confined lakefill in urbanized areas. Use of the urban residential fill criteria rather than the inert fill criteria would also make more material available for lakefilling activities, for the former criteria are less stringent than the latter for numerous chemicals. The amount of material available for lakefilling may be a concern, as discussed below.

New "Restricted" Class

If material meets the inert fill criteria, it can be used as confined fill. Use of the material as unconfined fill (fill which can be exposed to open water) requires meeting more stringent criteria. Hence, two classes of fill have been proposed, one restricted, in that the material must be confined, the other unrestricted, in that the fill may be deposited into open water (providing that criteria to control physical impacts are met). The classification system accords with the findings and recommendations of the Royal Commission on the Future of the Toronto Waterfront. The

RCFTW, in its final report, *Regeneration*, stated:

> The Royal Commission recommends that the Ministry of the Environment create a new "restricted fill" waste classification for excavated soil that is unsuitable for open water disposal, but does not require the degree of control imposed for sanitary landfill. Moreover, the MOE should actively assist in identifying and licensing suitable sites. (Recommendation 32).

The RCFTW recommended the creation of a restricted class of fill because it anticipated that if the 1976 Open Water Disposal Guidelines were replaced with more stringent guidelines regarding lakefilling and sediment quality, more material would be rejected as too contaminated for lakefill, yet would not be welcome at sanitary landfill sites, where capacity is limited. In fact, MOE has produced, in concert with the Lakefill Quality Guidelines, new Sediment Quality Guidelines to replace the Open Water Disposal Guidelines. The restricted fill class, or confined fill class, offers a "practical alternative", in that the material can be used as lakefill, but cannot be deposited in a manner that might harm the environment.

Application of the Guidelines

Exceedance of Guidelines

It is not clear from either the Lakefilling Guidelines or the Sampling and Analytical Protocols document how material proposed to be disposed of as lakefill should be sampled, *in situ* or as a material pile. Regardless of which method is required, it appears that one parameter exceedance will disqualify a large amount of material from lakefilling. MTRCA and others are concerned that strict application of the "one exceedance" rule may severely limit the availability of lakefill material. For example, MTRCA has tested its 100,000 cubic metres of material stockpiled at East Point Park and has determined that, if the new guidelines were applied, the majority of the material could not be used as lakefill, and none of it could be used as unconfined fill. Regardless of the project's merits, this conclusion is remarkable considering most of the material is native, excavated from the location of the intake tunnel under the lake at the Easterly Filtration Plant. MTRCA is concerned about similar difficulties in obtaining fill for the Etobicoke Motel Strip.

There may be a need for flexibility in the application of the guidelines. MTRCA's analyses have led the conservation authority to conclude that the lakefill guidelines are quite close to naturally occurring levels in the Metropolitan Toronto area, meaning that exceedances of one parameter will be relatively frequent. Exceedance of confined and unconfined criteria can be expected even in native materials in the Metro Toronto region.

It should be acknowledged that MOE's own analyses, as reported in the Initial Economic Assessment document prepared for the Materials Management Policy, have indicated that the amount of material available for lakefilling would decrease from 1.2 million tonnes to 0.8 million tonnes under the proposed policy. The decrease would be due to the elimination of old asphalt as an acceptable material for lakefilling, and reductions in the volumes of old concrete, dredged materials and excavated soil and rock.

If concerns about availability of material for lakefilling prove to be valid, then the "practical alternative" or solution envisioned by the creation of the confined or restricted class of fill will not be realized. Instead of the one exceedance rule, a more practical approach may be to permit use of averaging or statistical analyses of all parameter results to determine whether a given material is acceptable as lakefill (the MMP suggests some interesting alternatives). With some form of analyses which is more flexible than the one exceedance rule, the practice of lakefilling may still be environmentally benign, yet more economically feasible. This approach accords with the philosophy outlined in the previous section: the focus should an outcome goal, minimization or elimination of ecosystem impacts, rather than an input goal.

A more flexible approach should not necessarily be harmful to the aquatic environment. Material which is classified as confined lakefill material must be isolated from the water; it must be contained and confined. Given that the pathways to the aquatic environment are restricted, there may be room for marginal exceedances of the inert fill guidelines without causing harm. As suggested in the previous section, perhaps the exceedances could be X number of parameters up to the urban residential fill level. A list of the contaminants of relatively low toxicity could be prepared together with a "maximum exceedance limit" guideline. A flexible approach would increase the amount of material available for lakefilling, yet would protect both aquatic and terrestrial environments.

In keeping with its support of the results-oriented philosophy, the Trust would emphasize that there may be exceedances which should not be handled in a flexible manner. A large exceedance of the guideline by a highly toxic substance, or exceedances by many contaminants, should in no way be tolerated and should disqualify the material from use as lakefill. Above all other concerns, the aquatic and terrestrial environments must be protected, as per the purpose of the Guidelines. The flexible approach should be adopted where the exceedance of the guideline by one or two contaminants is slight, particularly in native material.

The List of Parameters

The list of parameters tested is comprehensive and reflects the known threats to aquatic ecosystems. There is also a scientific rationale for the selection of the parameter levels both for the inert fill test and for the unconfined fill test. It should be noted again, however, that the parameter levels for the inert fill test are background-based, while the parameter levels for the unconfined fill test are effects-based. Use of a consistent scientific rationale may be preferable as discussed above.

The Interim Confined Fill Guidelines List

Because lakefill will be screened according to the definition of inert fill in the Materials Management Policy, and because the Materials Management Policy has not been finalized, interim screening guidelines were included in the Lakefill Quality Guidelines as the Interim Confined Fill Guidelines Mandatory Parameter List (Appendix B). Material of residential or agricultural origin is screened against a list of inorganic parameters, while material from industrial or commercial origins is screened against the inorganics and a list of organic parameters.

It should be noted that three inorganic parameters on the Interim Guidelines list differ from the inert fill parameter levels under the proposed Materials Management Policy (Table 3-1 in the MMP). In the Interim Guidelines List, the maximum Cadmium level is 0.7 ppm, the Chromium VI level is 1.0 ppm, and the Mercury level is 0.2 ppm. In Table 3-1 of the Materials Management Policy, the maximum levels of these three parameters for inert fill is 0.71 ppm, 0.5 ppm and 0.13 ppm respectively. The Chromium VI and Mercury levels on the Interim Guidelines List approach the urban industrial fill levels under the Materials Management Policy, substantially higher than the inert fill level. In other words, the Materials Management Policy will be imposing a more stringent standard than the Interim Guidelines List. The discrepancies are significant given that the exceedance of a single parameter can render a large quantity of material unsuitable for lakefilling. What might qualify as fill under the interim list may not under the Materials Management Policy. It is suggested that one of the lists be adjusted to ensure consistency.

That material of agricultural origin need only be tested for three organic contaminants under the Interim Confined Fill Guidelines may be of concern, particularly if the material is to be used as unconfined fill. The Interim Guidelines List notes that residential and agricultural materials must be analyzed for PCBs, Total Organic Carbon and Total Phosphorus if the material is being considered for use as unconfined fill. It is conceivable that soil excavated from an agricultural site could contain significant loadings of organic compounds such as pesticides, and hence representative compounds should be included in the Interim Guidelines List.

Protection of Water Quality, Aquatic Habitat and Recreation Potential

The Lakefill Quality Guidelines must balance the goals of water quality and aquatic habitat protection and realization of recreation potential. As indicated in the sections above, the Trust believes that the Guidelines will largely protect aquatic habitat and water quality by setting stringent controls on the material available for lakefilling. In fact, as the comments above indicate, there may be room for a more flexible approach to lakefilling while still ensuring the integrity of aquatic ecosystems.

It was also noted that there are concerns about the future availability of material for lakefilling, given the new guidelines. If the amount of material which can meet the guidelines turns out to be significantly less than the amount of material needed for already proposed lakefilling projects, proponents of those projects fear that they may no longer be feasible. Hence, the protection of recreation potential by the proposed Lakefill Quality Guidelines is a matter which is uncertain at this time, and ought to be addressed further by MOE and representative proponents.

Several other diverse issues are addressed below, given their importance to water quality, protection of aquatic habitat and the feasibility of lakefilling activities.

Acceptability of Materials

As MTRCA indicates in its review of the Lakefill Quality Guidelines, rubble materials such as brick and concrete are required in addition to soil for lakefilling projects. The Guidelines indicate that "concrete rubble", as well as sand, gravel and excavated soil, is acceptable as fill material. Asphalt and construction debris are not permitted as unconfined fill unless the proponent can demonstrate that the material will not harm the aquatic environment. The Materials Management Policy goes further by proposing that asphalt should "no longer be allowed at clean fill or lakefill sites" and should be recycled or disposed of at confined landfill or municipal landfill sites.

The Lakefill Quality Guidelines and the MMP appear to be contradictory as to the acceptable uses of old asphalt. It is clear that the Guidelines must address more explicitly and specifically the acceptability of asphalt and types of rubble, and the testing requirements of each particular type of material (brick, concrete, debris, asphalt) must be clarified. MTRCA has indicated that testing requirements are inconsistently applied and the definitions of materials are unclear, penalizing some proponents and benefitting others.

Confining Structures

The confining structure within which confined fill is placed must be designed to withstand the most significant wave that could occur in storms over a 25-year period. Staff from the MOE have indicated that this design standard will be increased to the 100-year storm in order to be consistent with the Ministry of Natural Resource's use of the 100-year storm in its policy documents. The Trust supports and encourages this modification to the Lakefill Quality Guidelines.

Physical Impacts of Lakefilling and the Trust's Work

The Guidelines also include measures which must be followed in order to minimize the adverse impacts of turbidity caused by filling operations (Section 2.3). The measures essentially address the method and timing of lakefilling; the "how to" of the activity. Similarly, Appendix C outlines the types of projects to which the Guidelines apply, general conditions governing fill placement and siting and design considerations. Appendix C addresses the "how to" and the "where and when" considerations of lakefilling.

There is no mention in the proposed Guidelines that the Waterfront Regeneration Trust has been asked by the Minister of the Environment to prepare guidelines regarding the "how, when and where" of lakefilling in the Greater Toronto Bioregion. The Trust's role is noted, in part, in the Consultation Backgrounder document. There it is acknowledged that the Trust will be addressing the issues of when and where lakefilling is acceptable.

The Guidelines should reflect the fact that Appendix C and Section 2.3 address topics which will be considered by the Trust; indeed, the Trust is already considering terms of reference for the drafting of "how to" guidelines. The Trust would like to suggest two options for handling this issue:

1. The Lakefill Quality Guidelines could be altered such that Section 2.3, dealing with the physical effects of lakefilling, and Appendix C, particularly the engineering design elements, are removed from the document. The Guidelines, rather than including this material, could indicate that companion guidelines setting out the appropriate methods and locations of lakefilling will be produced by the Trust, in collaboration with the MOE, for review and implementation in the near future. This would leave the existing proposed guidelines to address solely the quality (as the title of the document states) of the material to be used (the "what"), and not the method and location.

2. Appendix C and Section 2.3 could be retained in the Lakefill Quality Guidelines, but as interim provisions until the release of the guidelines being drafted by the Trust in collaboration with the MOE. If this option is selected, it should be stated in the document that Appendix C and Section 2.3 are interim provisions, and will ultimately be superseded by more comprehensive guidelines prepared by the Trust and the MOE.

Amendments to Appendix C

Given the importance of physical effects, fill placement, and siting and design considerations to water and aquatic habitat quality, the Trust would recommend the second option. Accordingly, several comments on Appendix C follow:

1. In the Types of Projects section, it is indicated that the Guidelines would apply to "large-scale projects for recreational purposes". This statement may too narrowly define the application of the Guidelines. How is "large-scale" defined? By whether the project is subject to the Environmental

Assessment Act? Is the proposed Public Amenity Strip at the Etobicoke Motel Strip "large"? Would the proposed Metro Toronto Main Sewage Treatment Plant expansion be "large", if lakefilling was required? The Trust would suggest that the cumulative impact of numerous "small" projects (e.g. along single residence waterfront properties), whether clustered or spread out along the waterfront, should not be overlooked. Furthermore, "recreational purposes" is too limited. Large-scale projects constructed for any purpose should be subject to the Guidelines.

2. The section proposes that the Guidelines would not apply to 1) material placed on shorelands above the high water mark and adequately stabilized, and 2) material placed behind impermeable barriers such as concrete and sheetpile walls. These two situations do involve the placement of fill, and will be addressed by the Trust in some detail. The Trust is concerned that these two situations are too generally described. What does "adequately stabilized" entail? Merely prevention of creep and sliding which will ultimately place the material in the water? Or does stabilization include engineered works to prevent leachate from entering groundwater flow, to contain contaminated runoff, and to permit monitoring of surface and subsurface flows? For how long are concrete and sheetpile walls impermeable, and how would this be monitored? These are the types of issues that must be explicitly addressed if the desired "outcome" goal, ecosystem protection, is to be realized.

3. Throughout Appendix C it should be made clear that the "regional Director" is a director of the Ministry of the Environment, not another ministry such as the Ministry of Natural Resources.

4. Projects designated by the MOE regional Director as "emergency shoreline works" are exempted from the Guidelines. What is an "emergency shoreline work"? Would such a work ever be subject to these Guidelines or the guidelines to be drafted by the Trust (ie. following the emergency)? This exemption may be subject to abuse.

5. The Trust would agree that filling should occur only during calm periods, and that the length of fill exposed to wave activity should be minimized. However, the Guidelines require that the exposed fill face be no longer than 15 metres. Should a figure which was derived for one project be generally applied to all projects through the Guidelines? Is 15m sufficient for all large scale lakefilling projects? Can the distance be increased if other mitigative measures are taken, or depending on the type of fill material? Does the limit apply to soil and other relatively easily entrained material in the construction of the confining structure for confined fill? Again, these are issues the Trust expects to address.

6. The Trust supports the concepts proposed in the Siting and Design Considerations section, but again, requirements and goals must be explained in greater detail. For example, it is stated that lakefills "should be designed to minimize the creation of embayment areas...." Presumably, the goal is to prevent the creation of pollution sinks. However, there may be instances where embayments may be desirable, to promote wetland creation, for example. The key is to avoid the negative effects associated with embayments, not to rule out the possibility of embayments.

Sampling, Testing and Analytical Protocols

There is concern that the protocols require an excessive number of samples to be taken and analyzed, especially for native soils and homogeneous materials. This comment applies to both in-situ material and stockpiled material. MTRCA determined that for the 100,000 cubic metres of native material proposed to be used as lakefill at East Point Park, over 340 samples, costing approximately $87,000, would be required.

A review of the protocols should be made to determine whether the requirements can be made more flexible for native and homogeneous materials. Flexibility in sampling requirements based on knowledge of material characteristics and site history should be encouraged, bearing in mind the potential for abuse of a more accommodating approach.

Economic Impacts of the Guidelines

The chief economic impact of the proposed Guidelines is associated with the availability of fill material. As expressed throughout this review, some stakeholders are concerned that the Guidelines will reduce the availability of fill material, particularly material for unconfined fill.

Reduced fill availability will have two effects. First, material which was acceptable as lakefill material prior to the implementation of the Guidelines, but which is deemed unacceptable under the Guidelines, will have to be disposed of in some form of landfill (although the Trust encourages alternative disposal means, such as berms, grade elevations, etc, depending on material quality and engineering possibilities). Disposal costs on land are demonstrated in the Initial Economic Assessment document to be much higher than lakefilling costs ($5.5 to $10 / tonne for lakefilling versus $8 to $13 / tonne for inert landfill, $36 to $54 / tonne for controlled fill and $65 to $86 / tonne for municipal waste). The Initial Economic Assessment document indicates that the material disposed of at lakefill sites would decrease from 1.2 million tonnes to 0.8 million tonnes annually.

The second economic impact which may be associated with more stringent lakefill material standards is increased transportation costs as users of fill must search out sources over a greater area. The Initial Economic Assessment document suggests that transportation costs for lakefill will decrease by up to $2 / tonne. This reduction is based on the assumption that "materials which are the greatest distance from the current sites will likely be redirected to closer, newly formed sites" (presumably the urban residential, urban industrial and controlled fill sites permitted under the Materials Management Policy) rather than going to lakefill sites. This assumes that material disposal is wholly cost-driven and not demand-driven. In other words, the assumption has been made that generators in the past have disposed of material as lakefill because it was less expensive than disposal at municipal waste disposal sites, and in the future, with less expensive urban residential, urban industrial, and controlled fill sites, the fill will be disposed of in these more common, local sites.

It is possible, however, that in the past material was disposed of at lakefills due to the demand for such material at those sites, as well as for cost reasons. Probably, lakefilling activities reflected both forces. This means that, to the extent that lakefill demand continues, and grows as the recession ends and redevelopment increases, material will have to be found to meet the demand.

With more stringent standards, it is logical to conclude that less material from within the urbanized shoreline area will be suitable for lakefilling activities. If large lakefill projects proceed, and a demand for fill is created, inert fill will have to be transported from less contaminated areas, generally farther away from the urban shoreline locations of the major lakefilling projects. This can only mean higher transportation costs.

Conclusion

The proposed Lakefill Quality Guidelines represent progress in devising a network of policies to protect the aquatic environment. The Guidelines are rationally integrated with the Materials

Management Policy and the Sediment Quality Guidelines; such integration is encouraged by the Trust.

The Lakefill Quality Guidelines and the two associated policies are complex documents. Some re-writing may be necessary to ensure that the documents are usable by all parties affected by the policies. The Trust has concluded in many reports, including *Regeneration*, that a key reason for incremental environmental degradation and decision making which adversely affects the environment is that the "rules of the game" were not clear to the parties involved.

The Trust would advocate an "outcome" approach to the development and revision of the Lakefill Quality Guidelines. An outcome approach is designed to ensure environmental protection and at the same time provide more flexibility in managing lakefilling than an "input" approach. As stated in *Regeneration*, a "practical" approach should be taken to regulating lakefilling activities.

The Trust believes that more explicit reference to its preparation of guidelines regarding the method and location of lakefilling should be made in the Lakefilling Guidelines. Certainly location, and possibly the method, of lakefilling are as important in protecting the environment as the quality of material used for lakefilling. There exists an opportunity at this time to ensure that once the guidelines drafted by the Trust have been completed, the two sets of guidelines will integrate in a "seamless" fashion.

The Trust would be pleased to pursue discussions regarding any of its comments on the substance and structure of the Guidelines with ACES or Ministry of the Environment staff.

"MATERIALS MANAGEMENT POLICY AND LAKE FILL GUIDELINES"

Advisory Committee on Environmental Standards, London, 25 Nov. 1992

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In arriving at the opinions I have studied the following documents:

Backgrounds on Proposed Policy for Managing Excess Soil, Rock and Similar Materials; Sediment Quality Guidelines and Fill Quality, June 1992.

Fill Quality Guidelines, June 1992.

Guidelines for Aquatic Sediment, June 1992.

Sediment Guidelines for PCBs and Organochlorine Pesticides, June 1992.

Development of Sediment Quality Guidelines for PCBs and Organochlorine Pesticides, 1992.

Proposed Policy for Soil, Rock and Like Materials: Technical Consultation, June 1992.

All above are Environmental Ontario Publications.

IARC Monographs on the Carcinogenic Risk of Chemicals to Humans, June 1984 Polynuclear Aromatic Compounds Part 3 Lyon France.

Review and Recommendations for Canadian Environmental Quality Criteria for Contaminated Sites, Sci. Series 197 Environment Canada 1991.

Toxicological Profile for Polycyclic Aromatic Hydrocarbon US Dept. of Health and Human Services, 1990.

Creosote US Dept. of Health and Human Services, 1990.

Environmental Epideomiology Public Health and Hazardous Wastes NRC-USA, 1991.

Sediment Quality", W. Adams, R. Kimerle and J. Barnett. Envir. Sci. Tech. 26, 1865, 1992.

"PAHs in the Environment", C. Menzie, B. Potocki and J. Santodonato. Envir. Sci. Tech. 26, 1278, 1992.

IARC Monographs Vol. 48, 1990. "Nitrilo triacetic acid and its salts", pp 181-212.

"Global Distribution of Tris (4-chlorophenyl) Methanol in Higher Trophic Level Birds and Mammals", W. Jarman et. al. Envir. Sci. Tech. 26, 1770, 1992.

Ontario's Guidelines for Sewage Sludge Utilization on Agricultural Lands Ontario Ministry of Environment Jan. 1986.

Regulation 309 Jan. 1989. Environment Ontario

"Chlorinated dioxins and furans in the UK Environment" S. Harrad and K. Jones Sci. Tox. Envir. 126, 89, 1992.

"Placental transfer of metals of coal fly ash into various fetal organs of rats" Arch. Tox. 64, 153, 1990.

"Transport of Incinerated Organochlorine Compounds to Air, Water, Microlayer and Organisms" Microlayer and Organisms" Marine Pollution Bull., 21, 18, 1990.

Fill Quality for Landfilling and Sediment Quality Guidelines

The MOE documents and proposals fail to cope with the surface microlayer concept. Airborne hydrophobic pollutants including PCBs, Dioxins, PAHs and heavy metals concentrate on microscopic floating particles at the surface of large bodies of water. Concentrations of pollutant are high and damaging in the surface feeding layer. With time the buoyant particles saturate and sink to form contaminated sediment. Such sediment reach equilibrium returning buoyant microscopic particles to the microlayer. Contaminated sediments originate from both airborne and direct deposition both sources equilibrate particles with the surface.

The sediment "no effect level" 10 ppb PCBs actually is an unhealthy 10 ppb at the surface microlayer. The Mandatory Confined Fill Guideline for PCBs is 300 ppb PCBs. At the surface microlayer a surge of concentrated PCBs hits plankton feeders causing a rush of biomagnification. Interestingly, the microlayer equilibrium was ignored in establishing standards. The impact of polluted sediment on the microlayer should have been studied. In any industrial area their is a steady airborne deposition of toxic metals and PAHs. Air currents carry PCBs from older dump sites and operating equipment. Such depositions equilibrate with polluted sediment. For example St. Lawrence Cement of Mississauga burns about 10% of its fuel as chlorinated solvents. During the frequent ESP outrages about 10 tons of fly ash and partly burned chlorinated solvents along with mercury are spewed out to form a hot spot for polluted sediment along the lake Ontario lake front of Mississauga and Oakville. Fill at MOE guideline levels would not contribute a great deal more pollution than that present (which restricts human use severely). Fill at MOE guidelines would contribute disastrously to the surface layer equilibrium if deposited in unpolluted lake front.

My theory will likely be ignored or discounted by MOE bureaucrats. Unfortunately my theory is well founded and ignoring it will be costly as polluted fill is discharged indiscriminately.

Turning to particular guidelines the Guidelines for volatile organic chemicals (VOCs) are set strangely. The VOCs on the list either float or sink and none biomagnify. They are too volatile to form a surface layer problem. Even though they pose little threat they are regulated more stringently than the drinking water guideline. They contrast with PCBs. PAHs and pentachlorophenol whose guidelines are set several magnitudes higher. Such guidelines don't make sense.

It would be intelligent to set standards for gasoline polluted soil. Gasoline is rich in benzene and other VOC chemicals, it is a most ubiquitous fill contaminant originating from both commercial and industrial sources.

The pollutants list might usefully include tris (4-chlorophenyl) methanol a ubiquitous global pollutant originating from dyes and plastics. It has been found to biomagnify and to be present at high levels in mammals, birds and fish. The chemical may be a peroxisome proliferating carcinogen. Another pollutant perilous to ignore is Nitrilotriacetic acid, a breakdown product of non-phosphorous detergents. It is an ubiquitous pollutant in the great lakes. It causes kidney cancer and gene damage. Finally, PCB values by percent chlorine are not valuable in comparison to measurement of coplanar PCBs.

In conclusion, to sediments and fill guidelines, sediment quality guidelines are useful for benthic organism but ignore particle equilibrium with microlayer and damage to surface feeders. Fill guidelines appear irrational for VOCs. Values for PCBs would have been better set for coplanar isomers. Generally, surface microlayer particle equilibrium with sediment seems to have been ignored or discounted by MOE. The current guidelines are likely to cause catastrophic microlayer pollution with PCBs, PAHs and toxic metals.

Finally, it is worth pointing out that Benzo(a) pyrene is an appropriate surrogate for analysis of PAHs. Such a convention would serve a rapid inexpensive and highly accurate monoclonal (ELISA) analysis very well.

Policy for Management of Excess Soil, Rock and Like Material

The materials include excavated soil and rock along with foundry sand, coal ash, old concrete and dredged material. I will focus on foundry sand, coal ash and excavated soil from industrial sites. The proposal seems to mandate toxic waste disposal sites (controlled fill) in a haphazard way.

Foundry sand: It is very clear that foundry sand is generally highly polluted material. It bears heavy loads of toxic metals and carcinogenic PAHs according to the International Agency for Research on Cancer (IARC Monograph 34, 1984). In Ontario it is, however, used as fill in a haphazard and negligent manner. For example, such material was used as inert fill to "cap" the closed Upper Ottawa landfill in Hamilton during the early 1980's. The site study committee later acknowledged that the use of such fill had been a major mistake when analysis showed high levels of toxic metals and PAHs were present in the "inert" cap.

The huge volumes of foundry sand dumped on crude sites such as those near Ohsweken should no longer be allowed to pollute. The sand should be recycled.

Coal ash: A recent study (Sci. Tot. Envir. 126, 89, 1992) indicates that in the United Kingdom coal combustion is a major source of dioxin (about one third of the amount produced by domestic and incineration) and about three times the level of medical incinerators. Coal fly ash is teratogenic primarily due to the content of toxic metals (Arch. Toxicol. 64, 152, 1990). Bottom ash is somewhat less toxic provided that it had been quenched with water. However, high levels of toxin may remain even in quenched ash.

Recently I complained about land spreading of a mixture of coal fly ash and sewage sludge on agricultural land. The experiment was done even though the fly ash greatly exceeded the regulation 309 guideline for toxic waste. The sewage sludge spreading was not certified by MOE prior to the experiment. Such an experiment suggests that MOE has begun to employ indiscriminate polluting waste disposal to placate a utility. Certainly the proposal to classify coal fly ash as material similar to rock and excess soil may be a crude effort to "control" pollution by bureaucratic shuffling. Certainly the Minister of Environment shamelessly flaunted the regulations and equally shamelessly claimed that the polluting practice was consistent with the Minister's 3Rs Philosophy. I don't know where the Minister studied philosophy but the Minister certainly must have flunked ethics. Frankly, it is imperative that coal ash be treated as what it is, toxic material requiring careful disposal.

Excavated soil from industrial sites: Many industrial sites in urban centres are currently being converted to business or residential use. CCME (Criteria for contaminated Sites, 1991) provide guidelines for remediation. When the sites are remediated, care must be taken to ensure that contaminated fill is not processed.

To my understanding gasoline use and storage areas, both commercial and industrial, pose the largest volume of contaminated material. Toxic metals are encountered in relationship to metal fabrication and finishing, while creosote and pentachlorophenol (along with dioxin) are a problem with former wood finishing plants. Bioremediation is being tested to provide in situ remediation. Unfortunately the toxic metals are not remediated in the biological treatment and the resulting material may be heedlessly used as fill.

It is worth pointing out that bioremediation experiments show that volatile chemicals may be "air stripped" rather than remediated. What I mean is that the tillage practices used in bioremediation volatalizes chemicals causing a surge of air pollution.

Soil placement guidelines: The controlled fill concept is simply a uncontrolled toxic waste disposal site of another name. The guidelines for controlled fill frequently exceed the regulation 309 schedule by more than an order of magnitude (for example values for benzo(a) pyrene, benzene, mercury, arsenic and others). The flow chart showing a regulation 309 route for testing in the proposed policy is likely to be ignored. I predict that "controlled fill" sites will in fact be toxic waste sites more hazardous not less hazardous than municipal landfills. They will not have to fact siting anywhere near as strict as a solid waste landfill. Such sites create a threat of hazardous waste disposal in everyone's backyard.

For the most part the soil placement guidelines for urban industrial, urban residential and inert fill don't agree at all well with the interim remediation criteria for soil (CCME). In most instances the fill criteria should agree with remediation guidelines and it would provide a major financial saving for those undertaking excavations.

In conclusion, the controlled fill concept poses one of the greatest threats to the environment proposed in recent years. The proposal was carefully disguised and camouflaged by sneaking it in amongst very innocuous proposals. Its long term implementation would be a catastrophic blow to a stressed environment.

The guidelines for inert urban residential and urban industrial fill should be coordinated with guidelines for remediation such as those proposed by CCME. Similar Federal guidelines are available for railroad lands. The guidelines for fill should be coordinated with remediation guidelines or they will very likely be shot down in flames in courts and judicial boards.

In conclusion, fill from former industrial sites should meet appropriate criteria agricultural, residential/parkland or commercial industrial application. Such criteria should be applied scrupulously. As the other areas of application of the policy, MOE thinking revolves around slow expensive chemical methods for detecting pollution. The use of rapid inexpensive but high accurate monoclonal ELISA methods for detecting pollution has not yet penetrated MOEs consciousness, it should.

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Your file Votre référence

Our file Notre référence

07 January 1993

BY FACSIMILE

Dr. M. Goldberg
Chair, ACES
Ontario Ministry of the Environment
135 St. Clair Avenue West
Toronto, Ontario
M4V 1P5

Dear Dr. Goldberg:

Thank you for the opportunity to review and provide comment on the Ontario Ministry of Environment's (OMOE) Proposed Policy for Management of Excess Soil, Rock and Like Materials, the Fill Quality Guidelines for Lakefilling in Ontario and the Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. My office has coordinated an Environment Canada departmental review of the three documents.

The proposed Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario are a considerable improvement over the 1976 bulk chemistry based Open Water Disposal Guidelines. Environment Canada recognizes the initiative and considerable efforts of the Ministry of Environment in the development of these guidelines to protect environmental quality and provide guidance for contaminated sediment rehabilitation. The documents have attempted to make the guidelines quantifiable, easily measured, applicable to both fill quality and in-place pollutants, and biologically based. However, the proposed guidelines do not fully address the chemical, physical and biological factors associated with sediments. In this regard, while the proposed guidelines should limit the release of contaminants into the ecosystem, Environment Canada has serious reservations about accepting them for use in its assessment of dredge and lakefill proposals and for clean-up of contaminated sediment sites in areas of federal concern. Ongoing work by Environment Canada to develop biologically-based guidelines for Great Lakes sediment is believed to be the preferred approach that can demonstrate and quantify actual environmental impact. Our research is expected to be complete in fiscal year 94/95. In the meantime, Environment Canada is prepared to accept on an interim basis the OMOE guideline documents in its assessment of dredge and lakefill proposals and for the clean-up of contaminated sediment sites in areas of federal concern.

More specifically, our comments about the guidance documents stem from Environment Canada's review of earlier drafts of the Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. The guidelines recommend a two-tier approach in the determination of sediment quality: use of bulk sediment chemistry first, which may then trigger the need for biological investigation. This approach is inconsistent with International Joint Commission recommendations (IJC 1988), which emphasize biological assessment first off, with bulk sediment chemistry being supportive and diagnostic. The IJC approach was accepted by Environment Canada in 1989 and is being used in our four-year effort to develop biologically-based sediment quality guidelines for the Great Lakes.

These and other comments associated with the development of the OMOE's Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario have been previously communicated to OMOE following Environment Canada review of earlier draft versions. Since the Fill Quality Guidelines for Lakefilling in Ontario are merely the application of the OMOE's proposed sediment quality guidelines to determine the suitability of material for lakefilling, our comments are relevant to this guidance document as well.

Some of the fundamental concerns with the establishment of the guideline values included in the documents are elaborated further upon in the attachment to this letter. I have also included comments for the interim application of the guidance documents. If we can be of further assistance by clarifying some of our comments, or you would like to discuss our work to develop biologically based guidelines, please contact S. Humphrey, who coordinated Environment Canada's review, at (416) 973-1074.

Sincerely,

S. Llewellyn
Regional Director
Environmental Protection
Ontario Region

ENVIRONMENT CANADA REVIEW COMMENTS ON PROPOSED POLICY FOR MANAGEMENT OF EXCESS SOIL, ROCK AND LIKE MATERIALS, THE FILL QUALITY GUIDELINES FOR LAKEFILLING IN ONTARIO, AND THE GUIDELINES FOR THE PROTECTION AND MANAGEMENT OF AQUATIC SEDIMENT QUALITY IN ONTARIO -- NOVEMBER 1992

--Our greatest difficulty with the OMOE guidelines lies in the structural organization of the guideline development procedure, in that biological testing is not considered until a chemical guideline has been exceeded. This approach is inconsistent with the approach recommended by the IJC (1988), which has been adopted in great part by the USEPA and the US Army Corps of Engineers in their sediment assessments. The IJC approach emphasizes biological assessment with chemistry being supportive and diagnostic. Environment Canada has also adopted this approach in their development of biologically based sediment quality guidelines for the Great Lakes. Researchers are giving primary consideration to the integrity of resident biological communities as they are affected by processes such as bioaccumulation, biomagnification and the toxicity of contaminants. Physico-chemical data will be used for the interpretation and identification of the causative factors that result in the observed structure of the biological community at a given location.

While the OMOE advocates biologically based guidelines, in actuality, the guidelines are a chemical abstraction of biological guidelines. Since all the guideline numbers are based either on *effects* levels in the literature or predominantly on co-observation in field samples, it is really not practical to ignore synergistic and counteractive effects that can occur due to the presence of other chemical compounds and the complex of other environmental factors. In addition, the biological aspect of the guideline derivation must often be abandoned in favour of the chemical equilibrium partitioning approach (for non-polar organics, where Provincial Water Quality Objectives exist) and background concentrations for metals and polar organics, "until PWQOs or tissue level criteria become available".

--As presented, regional differences in background contaminant concentrations are not incorporated into OMOE sediment quality guidelines. Natural background concentrations of metals in sediments found in many of the twenty thousand lakes in Ontario exceed not only the 'lowest' but also the 'severe' effect level of metals in the guidelines. Implementation of these guidelines will necessitate classifying dredged sediments with naturally occuring elevated levels of metals as only acceptable for confined or upland disposal. This would result in an increased cost burden to the federal Department of Transport, who are responsible for maintaining navigable shipping channels and thereby undertake dredging throughout the Great Lakes Basin on a regular basis.

--The guidance documents acknowledge that there will be situations where high background levels of metals and nutrients in an area will modify the strict application of OMOE guidelines; however, it is not clear how and when the guidelines (and their exemptions) will be applied. In the absence of detailed implementation procedures for these site-specific cases, the guidelines are open to possible misinterpretation and inconsistency in their application across Ontario.

--The given values for metals are inconsistent. For example, if 0.6ug/g Cd in sediment has an effect on biota/water, then why would the 'lowest effect' level be given as 1.1ug/g simply because the background level is 1.1ug/g? Does Cd have an effect at 0.6ug/g or not? This inconsistency applies to other metals listed in the OMOE guidelines as well.

--The 'no effect' and 'lowest effect' levels for some of the organics, particularly chlordane and HCB, are unrealistic. A laboratory will have difficulties in distinguishing these two numbers due to the accuracy of the determination of the trace organic contaminants. This applies to most of the organics listed in the 1992 OMOE sediment guidelines. The variability in the analyses by different laboratories will, undoubtedly, lead to problems, particularly for concentrations at the 'lowest effect' level. What are the recommended analytical detection limits for the organic contaminants? OMOE should append to the guidance documents an analytical methods manual which would serve to provide more specific details on this and other issues related to analyses.

--Since there appears to be little difference in the 'no effect' and 'lowest effect' levels from an analytical perspective, it may be more appropriate to develop one guideline here, that is, a 'no effect' level. Developing a 'no effect' level based on the 'lowest effect' level would require consideration of bioaccumulation data. As it stands in the guidance documents, a 'no effect' level could not be calculated for most chemicals and the screening level concentration approach does not necessarily account for bioaccumulative substances. If most management options are triggered at the 'lowest effect' level, then bioaccumulation is not taken into account.

--The process of derivation of sediment quality guidelines using the screening level concentration depends on the original data sets, however there are no appendices containing information on the data sets or the derivation of guideline numbers.

--Verification of the validity of the guideline values is one of the most important factors of any guideline. It is essential to provide a verification step along with the proposed guideline. Also, a procedure for updating the sediment guidelines, as more information becomes available, should be included.

--A manual which details the number of samples, the type of sample, and sediment handling procedures will be essential for any user of the guideline and, therefore, should be appended to the guidance documents.

--The description of the two recommended bioassays along with their use in the sediment assessment process is inadequate. In the bioassays, is the test sediment sieved prior to carrying out the toxicity test? What is the recommended survival rate of the test species in the control sediment? Why is OMOE providing its own definition of the control sediment, and not using the widely accepted ASTM terminology? The results of the toxicity tests will be different for the two species; how should these differences be interpreted?

--Since the guideline values provided in Fill Quality Guidelines for Lakefilling in Ontario are identical to those provided in Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, the above nine comments apply to this document as well.

--In the Fill Quality Guidelines for Lakefilling in Ontario document, how was Table 1 derived? Why have pesticides and other organic contaminants been excluded?

--More reference should be made to the mandates and regulations of other government agencies at the federal, provincial and municipal levels which have significant impacts on materials management. Although it is realized these documents are not meant to be an exhaustive account of other agency responsibilities in this regard, it is necessary to acknowledge the interaction of these agencies so that potential conflicts may be avoided by proponents. Environment Canada requests that the following be added to the documents:

Fill Quality Guidelines for Lakefilling in Ontario

p. iii Existing Regulations

It should be noted that in certain areas within Ontario, the practice of lakefilling to create 'made land' is not allowed. For example, on the Trent-Severn Waterway and on the Rideau Canal, which are federally regulated waterways, permits are not issued for lakefilling to create 'made land'. Associated with this, federal regulations which should be mentioned include the Heritage Canal Regulations (Transport Act), and the new Canadian Environmental Assessment Act. The Environmental Assessment and Review Process is applicable to all dredge and fill activities occurring on federal lands and waterways.

p. vi Fill Quality Guidelines

It should be noted in this section that the Fisheries Act stipulates 'no net loss of fish habitat'. In the administration of the Act, this phrase is being interpreted strictly.

p. 1 Lakefilling in Ontario

One of the primary impacts of lakefilling on the aquatic environment is the destruction of the littoral zone. It is not only the fill quality that has to be considered, but the actual physical presence of the fill in the near-shore zone and its effects on the aquatic environment.

p. 3 Unconfined Fill Material

The final paragraph should be amended to read: "Material that meets these criteria qualifies as Unconfined Fill and is suitable for use in direct contact with open water, pending the appropriate approvals from other agencies."

p. 6 Rationale - Sedimentation

The document should emphasize that wetlands may be negatively impacted by fill lost during the lakefilling process and that the limitations of the provincial Wetland Policy may be applicable.

Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario

p. 7 Placement of Fill Directly Into a Watercourse

The statement "Fill material equal to, or better than the No Effect Level Guidelines can be used without restriction in a watercourse", should be qualified by adding that all necessary approvals from other agencies must first be obtained.

Proposed Policy for Management of Excess Soil, Rock and Like Materials

p. vii Approval Processes

The statement that "controlled fill will not attract scavenging species and its disposal sites will not have the objectional features of municipal landfill sites" is too general. The attraction of nuisance species to a controlled fill disposal site would be dependent upon the features of the surrounding environment (for example, feeding opportunities). The Leslie Street Spit at Toronto Outer Harbour requires gull control to scare birds away from the construction areas where controlled fill is being dumped. Both Ring-billed and Herring Gulls nest and loaf in areas without gull control measures.

p. 41 Scenario #9; Wetland Development

This example of the hypothetical development of a swampy area should include the following additional requirements: application of Fisheries Act to the site, applicability of provincial Wetland Policy, identification of potential wildlife habitat.

p. 1-9 Appendix I 3.5 Controlled Fill

The proposed policy will not permit a landfill site to be exempt from the Environmental Assessment Act and from Section 30 of the Environmental Protection Act if th site is on land covered by water. Since a wetland may be periodically flooded every year the document should state that the provision applies to wetlands as well.

p. 20 Approval Processess - Inert Fill

Restrictions or approvals for the placement of fill may also be required by the Ministry of Natural Resources and federal agencies.

the metropolitan toronto and region conservation authority
5 shoreham drive, downsview, ontario. m3n 1s4 661-6600 Fax 661-6898

Chief
Administrative
Officer

JAN 08 1993
ADVISORY COMMITTEE
ON ENVIRONMENTAL STANDARDS

1993 01 07

CFN. 24705

Mr. Mark Goldberg
Chair
The Advisory Committee on Environmental Standards
135 St. Clair Avenue West
Suite 100
Toronto, Ontario
M4V 1P5

Dear Sir:

I am pleased to submit our comments on the Ministry of the Environment's Fill Quality Guidelines for Lakefilling and the Proposed Policy for Management of Excess Soil, Rock and Like Materials.

These comments were approved by the Authority at their meeting #10/92 held on November 27, 1992.

While the proposed policy represents an improvement in the overall management of excess material, there are several areas of concern that would have significant implications on proposed Authority projects.

In the attached submission, we have outlined the issues and in some cases provided recommendations for your consideration. Due to time constraints in reviewing the documents; including the background reports, the Authority retained the services of Dames and Moore Canada to provide comments and recommendations on five specific issues. Their report is included with this submission.

In summary, the main issues of concern are:

1. Implementation of the policy and guidelines as proposed would have significant cost implications on proposed Authority projects along the Metropolitan Toronto Waterfront. These include the project for the Etobicoke Motel Strip Public Amenity Scheme and the East Point Park project in Scarborough.

2. A strict interpretation protocol for chemical test results would severely limit the availability of material for future lakefill projects along the Metro Toronto waterfront.

3. Prior to implementation of the policy, the following needs to be addressed:

    - establish Controlled Fill Site(s)
    - develop criteria for constructing confined lakefill sites
    - develop sampling protocol for testing ambient sediment quality at proposed lakefill sites
    - develop sampling protocol for stockpiles containing homogeneous material of known origin

4. The proposed guidelines for certain parameters have been lowered significantly and should be reviewed to take into account naturally occurring levels in native material in the Toronto area.

Other comments are provided in the attached submission. I would appreciate your consideration in reviewing these comments and we would be pleased to meet with Ministry of the Environment staff to discuss any of the comments in detail.

At this time, I would like to thank the Committee in allowing the Authority to review the documents and provide our comments.

Yours truly,

J. Craig Mather, P. Eng.
Chief Administrative Officer

NC/gds

Enclosures

22. MINISTRY OF THE ENVIRONMENT'S "MATERIALS MANAGEMENT POLICY FOR SOIL, ROCK AND LIKE MATERIALS" AND THE MINISTRY OF ENVIRONMENT'S "FILL QUALITY GUIDELINES FOR LAKEFILLING" FOR THE ADVISORY COMMITTEE ON ENVIRONMENTAL STANDARDS -Comments

This item was recommended for approval at Water and Related Land Management Advisory Board Meeting #8/92, held November 20, 1992.

KEY ISSUE
Final comments to the Advisory Committee on Environmental Standards (ACES) on the Ministry of the Environment (MOE) draft Lakefill Guidelines and Materials Management Policy.

Res. #202	Moved by:	Lorna Bissell
	Seconded by:	Peter Oyler

THAT the Advisory Committee on Environmental Standards be asked to consider the Authority's comments on the Ontario Ministry of the Environment documents entitled "Materials Management Policy for Soil, Rock and Like Materials" and "Fill Quality Guidelines for Lakefilling", with particular emphasis on the implications of these initiatives on the feasibility of the waterfront access objectives of the Authority's projects at the Motel Strip and East Point Park.

CARRIED

TO: The Chair and Members of the Water and Related Land Management Advisory Board, MTRCA, Meeting No. 8/92, November 20, 1992

FROM: Brian Denney, Manager, Engineering and Development Section, Water Resource Division

RE: **MINISTRY OF THE ENVIRONMENT'S "MATERIALS MANAGEMENT POLICY FOR SOIL, ROCK AND LIKE MATERIALS" AND THE MINISTRY OF ENVIRONMENT'S "FILL QUALITY GUIDELINES FOR LAKEFILLING" FOR THE ADVISORY COMMITTEE ON ENVIRONMENTAL STANDARDS**
-Comments

KEY ISSUE

Final comments to the Advisory Committee on Environmental Standards (ACES) on the Ministry of the Environment (MOE) draft Lakefill Guidelines and Materials Management Policy.

RECOMMENDATION

THE BOARD RECOMMENDS TO THE AUTHORITY THAT the Advisory Committee on Environmental Standards be asked to consider the Authority's comments on the Ontario Ministry of the Environment documents entitled "Materials Management Policy for Soil, Rock and Like Materials" and "Fill Quality Guidelines for Lakefilling", with particular emphasis on the implications of these initiatives on the feasibility of the waterfront access objectives of the Authority's projects at the Motel Strip and East Point Park.

BACKGROUND

At Water and Related Land Management Advisory Board Meeting #7/92, the Board received a staff report on the draft MOE Lakefill Guidelines and Materials Management Policy and recommended that staff prepare final comments and recommendations for the next meeting of the Board.

Analysis of the Proposed Documents

In September 1992, the Minister of the Environment asked the Advisory Committee on Environmental Standards to consult the public and make recommendations on the "Proposed Policy for Management of Excess Soil, Rock and Like Materials" and the "Fill Quality Guidelines for Lakefilling in Ontario". These documents were released for public comment along with a number of supporting documents:

1. Policy for Management of Excess Soil, Rock and Like Materials: Economic Assessment
2. Rationale for the Development of "Ontario Typical Range" of Chemical Parameters in Soil, Vegetation, Moss Bags and Snow
3. Rationale for the Development and Application of Bulk Soil Placement Guidelines for Disposal of Excess Soil, Rock and Like Materials
4. Sampling, Processing and Analytical Protocols for Bulk Characterization of Soil, Rock and Like Materials
5. Guidelines for the Decommissioning and Cleanup of Sites in Ontario (prepared in 1989)
6. Development of the Ontario Provincial Sediment Quality Guidelines for PCB's and Organo Chlorine Pesticides
7. Development of the Ontario Provincial Sediment Quality Guidelines for Arsenic, Cadmium, Copper, Lead, Manganese, Mercury, Nickel and Zinc
8. Aquatic Sediment Quality Guidelines

The deadline for written comments to ACES is January 8, 1993. The short period of time available to the Authority to provide technical comments on the documents in time to respond to ACES, necessitated a brief review.

Specific Comments

Lakefill Guidelines

Issue 1 - The Proposed Screening and Classification Systems

The Authority generally supports the screening and classification system for lakefilling outlined in this guideline. The system recognizes correctly that strict guidelines must be in place at lakefill sites and that those guidelines should be strictest for direct "open water" disposal of materials. The Authority also supports the use of ambient sediment quality data and the utilization of pre-colonial background levels within the decision making framework.

Issue 2 - Application of the Guidelines

The Lakefill Guidelines indicate that the failure of any parameter by any amount will cause the soil tested to be classified as failing the guideline. This strict policy is to be utilized in the Materials Management Policy as well as in the Lakefill Guidelines.

However, the Lakefill Guideline document does not contain information regarding the interpretation of test results received from multiple sample points at excavation sites. Since no such information is contained, it must be assumed that one exceedance of a particular parameter will in effect, disqualify an entire excavation site, or at least a large segment of the excavation site, from disposal warranted at that particular guideline level. The Authority feels that it is not practical to reject entire excavation sites because of one, or a few,. marginal exceedances of either the unconfined criteria or the confined criteria especially since the concentration levels of parameters on these guidelines are so near the levels at which they naturally occur.

The Authority's experience in operating the Improved Lakefill Quality Control Program has been that some marginal exceedances of these guidelines (both the unconfined and the confined criteria can be expected even in native soils. For this reason, a more practical interpretation system should be applied for lakefilling.

The Authority recommends to ACES that MOE be instructed to review the strict interpretation protocol implied in the document and consider a more practical interpretation protocol (for lakefilling only) that would utilize averaging of results and/or other statistical analysis across like soil strata. Staff has retained the services of Dames and Moore Ltd., to assist in recommending a statistical approach.

Issue 3 - Protection of Water Quality, Aquatic Habitat and Recreation Potential

a) Old Asphalt

The Lakefill Guidelines state that asphalt is "not considered acceptable for use in contact with open water, though such material may be considered for use where the proponent is able to demonstrate through studies funded by the proponent, that the material will not adversely affect the environment". The proposed Policy will require that broken asphalt be recycled or disposed of at a controlled fill site or municipal landfill site.

The Authority agrees with the elimination of broken asphalt for open water filling operations. Asphalt, however, should be acceptable for reuse as base material for roads and parking lots at lakefill sites as being acceptable engineered construction applications. It should also be appropriate to use hot mix asphalt as the final treatment for the roads/parking lots and waterfront trails.

b) Confined Engineering Criteria

It is conceivable that any new lakefill sites created under these new guidelines would have to be constructed utilizing confined filling techniques in order to offset a lack of available soils for unconfined disposal due to the strict nature of the unconfined criteria. Neither this document, nor the background documents, outline any engineering principles or techniques which should be required for the creation of confined fill structures.

The Authority is concerned that since unconfined lakefilling along the Metro Toronto shoreline will be very limited under the new guidelines, reasonable criteria for constructing confined fill conditions need to be provided before these guidelines go into effect. Failure to allow for such reasonable criteria for the construction of confined fill structures may seriously jeopardize the Authority's very important future initiatives on the waterfront.

The Authority recommends that the MOE include engineering criteria for constructing confined lakefill sites with the Lakefill Guidelines. Such criteria should include the type of materials allowable for construction of confined endikements and materials to be used for protecting these structure if necessary.

Issue 4 - Sampling, Testing and Analytical Protocols

a) Sampling Requirements for Excavation Sites Generating Fill

The background document entitled "Sampling, Processing and Analytical Protocols for Bulk Characterization of Soil, Rock and Like Materials" contains, in the Authority's opinion, excessive and unnecessary requirements for sampling both in-situ soils and stockpiles of homogeneous soils.

Soil sampling protocols which are based on complete geotechnical information, existing land uses and a detailed site history are accurate yet practical. The sampling protocol for in-situ soils, as outlined in the background document is, in the opinion of the MTRCA, likely to be excessive in many cases depending on the site specific information. The Authority believes that the requirements for sampling surficial soils and previously filled soils are reasonable but the number of samples required for native soils to depth are, in most cases, excessive. The Authority is concerned that excessive and costly sampling requirements will lead to a decrease in the amount of testing done and an increase in the amount of illegal dumping.

The Authority recommends to ACES that the MOE be instructed to review the sampling requirements for in-situ soils with the intent to develop a more practical sampling protocol for in-situ native soils.

b) Sampling requirements for Stockpiles

The Authority is concerned that sampling protocols for stockpiled soils, as outlined in the background documents, do not distinguish between stockpiles of heterogenous soils from unknown origin and stockpiles of homogeneous soil of known origin. Clearly, these two situations should not be subjected to the same sampling requirements.

New sampling requirements for stockpiles of homogeneous soil should be developed. These requirements should be substantially less then the requirements for heterogeneous stockpiles.

c) Criteria for Testing Ambient Sediment Quality at Proposed Lakefill Locations

The Authority as a lakefill proponent requires guidelines for sampling ambient sediment quality at proposed lakefill sites in order to determine what the actual guidelines governing lakefilling at that specific site will be. No such information is provided in either the Lakefill Guidelines or in the supporting documents.

The Lakefill Guidelines and/or the background documents should provide sampling protocol for testing the ambient sediment quality at proposed lakefill locations.

Issue 5 - Quality of Lakefilled "Rubble" Material

In addition to soil materials, the process of lakefilling requires the utilization of rubble material such as brick and concrete. Currently, there is a great deal of confusion regarding testing requirements for this type of material. The Authority has requested chemical testing of rubble material in certain situations where contamination has been expected. However, there is a great deal of confusion among soils consultants as to when the testing of rubble is necessary, what type of testing should be performed and how the results should be interpreted. This ambiguous policy has often led to the penalization of applicants who test their rubble materials while applicants who do not perform testing are allowed to lakefill.

The MOE should include a less ambiguous policy on the issue of rubble quality at lakefills. The policy should address when testing is necessary, what testing should be performed and how the results should be interpreted.

Materials Management Policy for Soil, Rock and Like Materials

Issue 1 - The Proposed Classification System

The Authority believes that this policy is a positive step toward controlling landfill quality, diverting materials away from sanitary landfill sites and standardizing testing requirements and procedures of all soils management policies from the Lakefill Guidelines through to Regulation 309.

Issue 2 - Responsibilities of Generators and Receivers

The Authority feels that the permit by rule system would be more reliable if excavation site owners were designated as the generator. This change would remove the confusion surrounding who must initiate the testing process and ensure that the owner of the soil be responsible for its disposal.

Definition for "generator" is to include the owner of the property generating the fill.

Issue 3 - Enforcement and Protection of ground and Surface Waters

The Authority is concerned that while new stringent lakefill guidelines are being enforced, the potential for ground water contamination may actually increase since rural landfill sites do not fall under the changes to Regulation 309.
Under the policy, rural "inert fill" sites are not subjected to audit by MOE inspectors unless a public complaint is logged. The Authority is concerned that rural landfill sites may then become the dumping ground for excavators trying to circumvent the system and avoid the cost of testing. Excavators may deposit their "inert fill" in these sites without fear of MOE audit. Many of these rural landfills (eg. sites in the Oak Ridges Moraine) exhibit very high potentials for impacting on ground water quality.

Clearly, a more pro-active method of ensuring fill quality at rural landfill sites is required. At Meeting #3/91, the Authority directed staff to prepare a program for an Inland Fill Quality Control Program for Watershed Protection within the regulated areas of the Authority's jurisdiction as well as those areas where the Authority's assistance is requested by a member or area municipality or the Province of Ontario.

The Authority recommends that the MOE work to help the Authority protect rural landfill sites and ground water quality. The MOE should consider empowering Conservation Authorities to control the quality of fill being used at these sites. The Authority feels that it's Inland Fill Quality Control Program for Watershed Protection would be an ideal pro-active program to protect these rural sites and the ground water quality.

Issue 4 - The Approval and Regulation of Controlled Fill Sites

The Authority believes that Controlled Fill Sites should be available before this policy is implemented. Without the availability of such sites, there may be an increase in illegal dumping and no reduction in soils going to sanitary landfill sites.

The Authority supports the recommendation of staff of the Toronto Harbour Commissioners that Controlled Fill Sites be treated as temporary disposal locations or "holding sites" and that the Materials Management Policy's ultimate goal should be to eventually remediate the soils contained in these sites. Thus the soil in these sites would be treated as a resource and not as a waste, in keeping with the 3 R's philosophy, and no land space would be permanently lost. Operators of Controlled Fill Sites should be made to invest a percentage of their revenues in a clean up fund which would be used to remediate the soils when the technology was available.

Issue 5 - Sampling, Testing and Analytical Protocols

As described above, the Authority is concerned that the sampling requirements for in-situ soils and stockpiles are needlessly excessive and may act to dissuade generators from testing their soils (see the recommendations made above under the Lakefill Guideline comments).

Issue 6 - Figure 1 (attached Decision Tree)

The chart is useful in understanding the proposed Policy. The classification labelled "Handle as Waste" should be clarified by showing that the current Regulation 309 will apply.

Implications of the New Guidelines on Authority Programs

The new lakefill guidelines will have an immediate affect on proposed Authority projects under the Lake Ontario Waterfront Regeneration Project. The new guidelines for fill quality are more stringent than the present Open Water Guidelines used by the Authority and with less flexibility in interpreting the chemical tests, will result in less material being suitable for lakefilling. New methods of lakefilling will need to be engineered to prevent loss of fines and maintain structural integrity as availability of suitable fill becomes unreliable.

a) East Point Park

Chemical testing shows that the existing fill stockpile at East Point Park will not meet the new "Unconfined" category for open water filling. The approximate 100,000 cubic metres of material in stockpile was generated from excavation of the intake tunnel for the Easterly Filtration Plant and therefore is considered to be "native" material. For this material to be acceptable for lakefilling, an engineered endikement will need to be constructed wherein the stockpile can be placed.

There is no approved Master Plan in place for this site so it is difficult to determine the cost implications of the proposed guidelines. Based on the preliminary Master Plan for the waterfront park, construction of a rock containment structure could add seven to eight million dollars to the cost of the project. The Authority continues to hope that the Waterfront Regeneration Trust will treat East Point Park as a pilot project and carefully assess all aspects of economic and environmental feasibility.

b) Etobicoke Motel Strip

Approximately 150,000 cubic metres of clean fill is required to construct the Public Amenity Strip for the Etobicoke Motel Strip. With the proposed new lakefill guidelines in place, it may be very difficult locating surplus clean fill without having to purchase suitable material.

Because there will be a time constraint in completing the filling, it is estimated that there would be a minimum additional cost of approximately $300,000 to $600,000 to purchase clean fill plus the cost of monitoring this soil quality, estimated at $150,00.

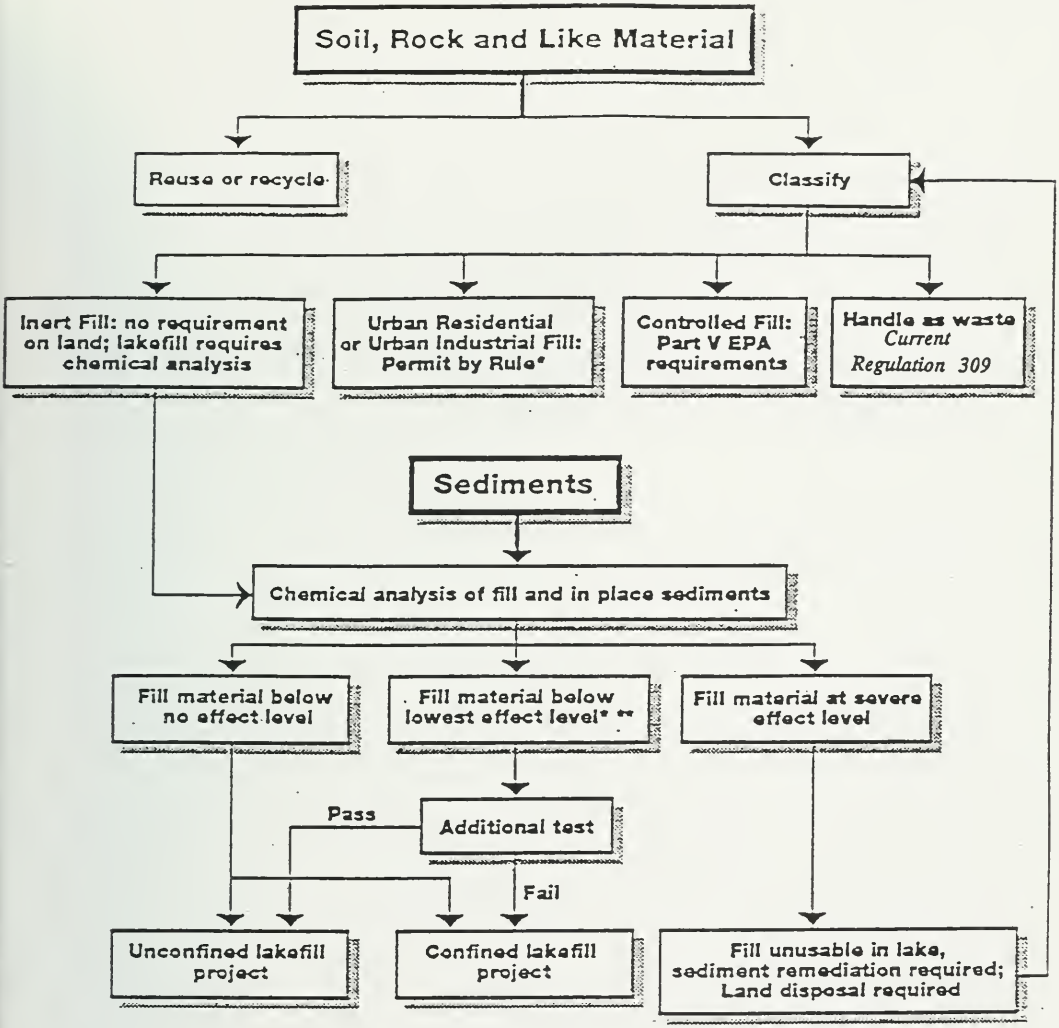
c) Tommy Thompson Park

The new lakefill guidelines will not apply to the Leslie Street Spit. This lakefill site, which is operated by the Toronto Harbour Commissioners, will continue to accept "open water quality" fill as administered by the Authority's Improved Lakefill Quality Control Program until the project is complete. The project has been "grandparented" since it is so close to completion.

d) Scarborough Shoreline Protection

The new lakefill guidelines will also have an affect on proposed erosion control projects along the Lake Ontario Shoreline. An uncertain availability of clean fill may delay the ultimate completion of the proposed Sylvan Avenue erosion control project along the Scarborough bluffs.

EXCESS SOIL, ROCK AND LIKE MATERIAL AND ITS RELATIONSHIP TO LAKEFILL PROJECTS


Soil, Rock and Like Material
Reuse or recycle
Classify
Inert Fill: no requirement on land; lakefill requires chemical analysis
Urban Residential or Urban Industrial Fill: Permit by Rule*
Controlled Fill: Part V EPA requirements
Handle as waste Current Regulation 309
Sediments
Chemical analysis of fill and in place sediments
Fill material below no effect level
Fill material below lowest effect level* **
Fill material at severe effect level
Additional test
Pass
Fail
Unconfined lakefill project
Confined lakefill project
Fill unusable in lake, sediment remediation required; Land disposal required

* Fill material must be same or better quality than the receiving site.

** For details see Fill Quality Guidelines for Lakefilling in Ontario: Application of Sediment and Water Quality Guidelines to Lakefilling (June 1992).

FIGURE 1

DAMES & MOORE, CANADA THE ENVIRONMENTAL PROFESSIONALS
7560 AIRPORT ROAD, MISSISSAUGA, ONTARIO L4T 2H5 TEL (416) 671-9921 FAX (416) 672-7784

Project: 17281-003

December 31, 1992

The Metropolitan Toronto and
Region Conservation Authority
5 Shoreham Drive
Downsview, Ontario
M3N 1S4

Attention: Nigel Cowey, Project Engineer
Engineering and Development
Section, Water Resources Division

Dear Sirs:

Review of Proposed Lakefill Quality Guidelines and Policy for Management of Excess Soil, Rock and Like Materials

At the request of the Metropolitan Toronto and Region Conservation Authority (MTRCA), Dames & Moore, Canada (DMC) have reviewed the draft documents titled: **Fill Quality Guidelines for Lakefilling in Ontario**, prepared by the Water Resources Branch, Ontario Ministry of the Environment, June 1992 and the **Proposed Policy for Management of Excess Soil, Rock and Like Materials** (Materials Management Policy), prepared by the Materials Management Policy Committee, Ontario Ministry of the Environment (MOE), August 1992 in accordance with the following Terms of Reference:

1. Provide comment and recommendations on the proposed list of parameters for the confined and unconfined lakefill classifications with regard to their scientific validity and completeness.
2. Provide specific comment on the validity of the guidelines for phosphorus (unconfined list) and silver and cadmium (confined list) and whether there should be flexibility in the application of the guidelines, particularly for native materials.

3. Provide comment on problems associated with quality assurance and quality control (QA/QC) practices at analytical laboratories and potential for incorrect classification of fill materials in view of the lack of provisions for the accreditation and auditing of laboratories.

4. Conduct a limited review of test results of soils from the Metropolitan Toronto area to assess the availability of material for lakefilling under the new guidelines. These data would be used to support requests by the MTRCA for flexibility in interpreting test data.

5. Provide comment on the MOE proposal to restrict disposal of old asphalt to controlled sites in view of the MOE designation of asphalt as a recyclable material. Is the re-use of crushed asphalt as roadbase an acceptable at lakefill sites?

During our review, DMC made reference to the documents listed at the end of this report. Background material used in drafting our comments may be found in Appendices A and B.

COMMENT

Dames & Moore, Canada (DMC) concur with the general intent of the proposed Materials Management Policy (MMP); specifically, to provide reasonable , practical and environmentally responsible approach to the management of excess soil, rock and like materials. The proposed policy has addressed many of the inconsistencies and confusion associated with previous fill management policies; for example, the provision for the establishment of controlled fill sites for the disposal of marginally contaminated soil. Under previous policies, soil that marginally exceeded the industrial cleanup guidelines (MOE, 1989) was often disposed of at municipal landfill sites even though the risk to human health and the environment was likely minimal. Furthermore, the integration (linkage) of the MMP with the Fill Quality Guidelines for Lakefilling and the Decommissioning Policy and associated Guidelines for Industrial Sites is a major step in developing a comprehensive and effective materials management policy.

The proposed MMP is the most comprehensive documentation, review and assessment of fill management to date. However, the development of the Ontario Typical Range (OTR_{98}) on the basis of surface soil data alone may present an inaccurate assessment of bulk chemistry of native materials below the soil horizon. During our review of the MMP, DMC conducted a brief review of the bulk chemistry of native overburden and rock in the Toronto area reference to which is included in our comments.

Our specific comments on the proposed MMP and the Provincial Sediment Quality Guidelines (PSQG) are as follows:

1. The proposed list of inorganic and organic parameters included in the PSQG for **unconfined and confined lakefill** is generally consistent with current scientific understanding of the key parameters that can, in excessive concentrations, be detrimental to aquatic life. However, we are concerned about a maximum acceptable concentrations for a number of the parameters in view of typical concentrations found in native materials in the southern Ontario.

    - The relatively low Sodium Adsorption Ratio (SAR) of 0.7 could result in the rejection of fill material that could otherwise satisfy the criteria for open water disposal. SAR values were not developed to assess impact on aquatic life but rather to assess the effect elevated levels of sodium on terrestrial plants. We recognize that some control over salinity of fill materials entering the aquatic environment is necessary but this can be achieved with the guideline set for electrical conductivity. **DMC recommend that electrical conductivity be used in place of SAR in the decision tree for the screening of fill materials for unconfined lakefill.**

    - The lowest effect level for nickel (16 ug/g) does not reflect the nickel concentrations typically found in native materials in parts of southern Ontario. A brief review of nickel concentrations in grey shales from the Toronto area indicated nickel concentrations ranging from 15 to 34 ug/g. Similar concentrations can be expected in native tills. DMC recommend that the acceptable concentration for nickel in unconfined lakefill be set 38 ug/g .

- The lowest effect level for phosphorus (600 ug/g) is very close to the average that might be expected for samples of native overburden and rock in the Toronto area. **DMC recommend that the acceptable concentration for phosphorus in unconfined lakefill be set at 800 ug/g.**

- The concentrations of iron in samples of native overburden and rock in the Toronto area are generally in the range of 15,000 to 25,000 ug/g. The proposed lowest effect level for unconfined lakefill is 20,000 ug/g. **DMC recommend that the acceptable concentration for iron in unconfined lakefill be set at 25,000 ug/g.**

With regards to the expected concentrations of silver and cadmium, our limited review of chemical data from native overburden and rock in the Toronto area indicated that:

- The concentrations of silver are generally less than the MDL of 0.2 ug/g which is available from most laboratories. The guideline for silver in confined fill is 0.27 ug/g.

- The concentrations of cadmium are generally less than the MDL of 0.5 ug/g which is available from most laboratories. The guideline for cadmium in confined fill is 0.71 ug/g.

If the proposed lowest effect levels for nickel, iron and phosphorus are implemented, much of the rock material from excavations in Toronto and vicinity may be unsuitable for unconfined lakefill. **DMC recommend that the MOE adjust the lowest effect levels set for these parameters to reflect concentrations typically found in native overburden and rock materials.**

2. The principle stated in Section 3.4.1 of the MMP that a single parameter exceeding the SPG automatically places the subject material in a more restricted category is not defensible and in our opinion compromises the intended flexibility of the policy in terms of soil management options. There is inherent uncertainty in all chemical analyses which can be particularly large in the case of heterogeneous material such as soil and rock. Section 3.4 of the MMP acknowledges the chemical variability of soil and soil like materials and states

that all sampling plans must account for this variability. Duplication of chemical analyses from replicate samples of soil and rock is very difficult. DMC recommend that there should be a range of, say SPG + 10 or 20 percent for which at least two or three parameters must fail before a material is considered unsuitable for lakefill.

3. There is no useful reason for splitting some groups of parameters into "mandatory" and "additional". Chemicals belonging to groups; such as, volatile aromatic hydrocarbons (BTEX), chlorinated volatile organic compounds (VOCs), and polycyclic aromatic hydrocarbons (PAHs) etc. are currently determined as a group and the time and expense required to separate and quantify a subgroup of them is just as great as analysing for the whole group. Although some compounds within a group may be more widely distributed than others and therefore of more general interest, SPGs have been proposed for all of them. DMC recommend that if a group of hydrocarbons are suspected in a soil that members of the entire group be analysed for.

4. There is the possibility for incorrect classification of fill materials as a result of problems with quality assurance and quality control at analytical laboratories. This concern is real in view of there being no provisions within the proposed MMP for accreditation and auditing of laboratories.

At present there are no generally accepted procedures, either federal or provincial, for the preparation and bulk chemical analysis of soils. The Canadian Association of Environmental Analytical Laboratories (CAEAL), which has only begun to develop an accreditation program, has concentrated on analysis of water and has yet to include any soil, rock and like material into their program. Thus the appearance of the draft version of "Sampling, Processing and Analytical Procedures for Soil Rock and Like Materials" (MOE, 1992e) is a welcome document.

While the sampling protocols suggested in this document (MOE, 1992e) have been thoroughly investigated and an analytical QA/QC proposed, unfortunately the same cannot be said for sample preparation procedures. In the grinding of heterogeneous samples from materials such as soil and rock, it is very easy to create non-representative and/or contaminated sub-samples. The techniques which provide for representative samples for waste water cannot be applied with same degree of confidence to soils. DMC recommend that a thorough description of suitable techniques be provided in the procedures document, in view of the fact that no laboratory accreditation and evaluation program exists for these procedures.

5. Our interpretation of the proposed MMP for the management of asphalt, a recyclable material, is that the MOE encourages the reuse and recycling of asphalt as part or their 3R Program. If, however, asphalt is not suitable as a recyclable material and the only option is disposal, then the MMP will require that it be disposed of at a controlled fill site. Consequently, subject to geotechnical considerations, the use of recycled asphalt as road base material is in our opinion an entirely suitable reuse. If new asphalt is considered suitable as a surface for access roads at lakefill sites then there is no reason to exclude weathered asphalt (from which volatile organics are for the most part absent) as a subgrade for the access roads. **DMC recommend that recycled asphalt be an acceptable material for use as roadbase at lakefill sites.**

This review has been specific to concerns that apply to the application of the proposed MMP to lakefill sites. However, many of our comments are applicable to the residential, industrial and controlled fill sites.

If you have any questions regarding our comments, please contact the undersigned. If Dames & Moore, Canada can be of further assistance to the Authority, we would be pleased to meet at your convenience.

Yours very truly,

Peter Duckworth Ph.D.
Senior Consultant

REFERENCES

1. Metropolitan Toronto and Region Conservation Authority, 1989a. **The Manual for an Improved Lakefill Quality Control Program**, prepared by Trow, Dames & Moore, March 1989, 26p. and Appendices.
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APPENDIX A

PROVINCIAL SEDIMENT QUALITY GUIDELINES

APPENDIX A

PROVINCIAL SEDIMENT QUALITY GUIDELINES

Table 1: Provincial Sediment Quality Guidelines for Metals and Nutrients.
(values[a] in ug/g (ppm) dry weight unless otherwise noted)

METALS	No-Effect Level	Lowest Effect Level	Severe Effect Level
Arsenic	-	6	33
Cadmium	-	0.6	10
Chromium	-	26	110
Copper	-	16	110
Iron (%)	-	2	4
Lead	-	31	250
Manganese	-	460	1100
Mercury	-	0.2	2
Nickel	-	16	75
Zinc	-	120	820
NUTRIENTS			
TOC (%)	-	1	10
TKN	-	550	4800
TP	-	600	2000

[a] - values less than 10 have been rounded to 1 significant digit. Values greater than 10 have been rounded to two significant digits except for round numbers which remain unchanged (e.g., 400).

"-" - denotes insufficient data/no suitable method.

TOC - Total Organic Carbon TKN - Total Kjeldahl Nitrogen TP - Total Phosphorus

(Lakefill February 1992)

Table 2: Provincial Sediment Quality Guidelines for Organic Compounds.
(values[a] in µg/g (ppm) dry weight unless otherwise noted)

Compound	No Effect Level	Lowest Effect Level	Severe Effect Level (µg/g organic carbon)*
Aldrin	-	0.002	8
BHC	-	0.003	12
α-BHC	-	0.006	10
β-BHC	-	0.005	21
γ-BHC	0.0002	(0.003)[b]	(1)[c]
Chlordane	0.005	0.007	6
DDT(total)	-	0.007	12
op+pp-DDT	-	0.008	71
pp-DDD	-	0.008	6
pp-DDE	-	0.005	19
Dieldrin	0.0006	0.002	91
Endrin	0.0005	0.003	130
HCB	0.01	0.02	24
Heptachlor	0.0003	-	-
H epoxide	-	0.005[b]	5[c]
Mirex	-	0.007	130
PCB(total)	0.01	0.07	530
PCB 1254[d]	-	(0.06)[b]	(34)[c]
PCB 1248[d]	-	(0.03)[b]	(150)[c]
PCB 1016[d]	-	(0.007)[b]	(53)[c]
PCB 1260[d]	-	(0.005)[b]	(24)[c]
PAH (total)	-	(2)	(11,000)

Lowest Effect Levels and Severe Effect Levels are based on the 5th and 95th percentiles respectively of the Screening Level Concentration (SLC) (see Section 4.2.4) except where noted otherwise.

( ) Denotes tentative guidelines

[a] - Values less than 10 have been rounded to 1 significant digit. Values greater than 10 have been rounded to 2 significant digits except for round numbers which remain unchanged.

[b] - 10% SLC.

[c] - 90% SLC.

[d] - Analyses for PCB Arochlors are not mandatory unless specifically requested by MOE.

- Insufficient data to calculate guideline.

* Numbers in this column are to be converted to bulk sediment values by multiplying by the actual TOC concentration of the sediments (to a maximum of 10%), e.g. analysis of a sediment sample gave a PCB value of 30 ppm and a TOC of 5%. The value for PCB in the Severe Effects column is first converted to a bulk sediment value for a sediment with 5% TOC by multiplying 530 x 0.05 = 26.5 ppm as the Severe Effect Level guidelines for that sediment. The measured value of 30 ppm is then compared with this bulk sediment value and is found to exceed the guideline.

PAH (total) is the sum of 16 PAH compounds: Acenaphthene, Acenaphthylene, Anthracene, Benzo(k)fluoranthene, Benzo(b)fluorene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(g,h,i,)perylene, Chrysene, Dibenzo(a,h,)anthracene, Fluoranthene, Fluorene, Indeno(1,2,3-cd)pyrene, Naphthalene, Phenanthrene and Pyrene.

(Lakefill February 1992)

APPENDIX B

SUMMARY OF THE PROPOSED POLICY FOR MANAGEMENT OF EXCESS SOIL, ROCK AND LIKE MATERIALS

APPENDIX B

Interim* Confined Fill Guidelines Mandatory Parameter List

Material of Residential/Agricultural Origin

PARAMETER	GUIDELINE ug/g
Antimony	0.43
Arsenic	11
Barium	160
Beryllium	1.1
Cadmium	0.7
Chromium VI	1
Chromium (total)	58
Cobalt	16
Copper	41
Lead	45
Mercury	0.2
Molybdenum	1
Nickel	38
Selenium	0.93
Silver	0.27
Vanadium	77
Zinc	120
Electrical Conductivity	0.36
Sodium Absorption Ratio	0.7
pH	3-10

PLUS: Any elements or compounds which an examination of the history of origins of the material indicate are likely to be of concern.

In addition, material that may be considered for use as Unconfined Fill should also be analysed for PCBs, Total Organic Carbon and Total Phosphorus. These analyses are not required if the material is being considered only as Confined Fill.

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* These interim guidelines are adapted from the Proposed Policy for Management of Excess Soil, Rock and Like Materials. MOE May 1992 (draft) and define the upper limit of material that can be used in a lakefill.

Material of Industrial/Commercial Origin

PARAMETER	GUIDELINE (ug/g)
Inorganics	
As listed for Material of Residential/Agricultural Origin	
Volatile Organic Compounds	
Benzene	0.002
Toluene	0.002
Xylene (total)	0.002
Carbon tetrachloride	0.002
Trichloroethylene	0.004
Trichlorofluoromethane	0.012
Methylene chloride (dichloromethane)	0.003
Ethylene dichloride (1,2-dichloroethane)	0.002
1,1,1-trichloroethane	0.005
Tetrachloroethylene	0.002
Polychlorinated Biphenyls	
PCBs	0.3
Polycyclic Aromatic Hydrocarbons	
Benzo(a)pyrene	0.05
Dibenz(a,h)anthracene	0.1
Benzo(a)anthracene	0.05
Benzo(g,h,i)perylene	0.1
Fluoranthene	0.14
Phenanthrene	0.092
Naphthalene	0.05
Pyrene	0.11
Phenols	
2,4,6-trichlorophenol	0.1
2,4-dichlorophenol	0.1
p-cresol	0.1
pentachlorophenol	0.1

Plus

Any elements or compounds, which an examination of the history of origins of the material indicate, are likely to be of concern.

As stated in the Executive Summary of the draft Materials Management Policy (MMP), the purpose of the policy is to manage excess soil materials in a consistent and appropriate manner that does not pose a risk to human and environmental health, is economical, does not strain landfill site resources, safeguards the quality of existing soils from contamination by improperly imported and deposited fill within the overall management framework of Regulation 309 under the Environmental Protection Act.

The policy is intended to clearly establish protocols for the management of excess soil, outline the procedures for categorizing these materials and expand options for managing them. Fundamental to the integration process will be the establishment of linkages with 3R management concepts and recently released **Fill Quality Guidelines for Lakefill in Ontario (MOE, 1992c)** and **The Guidelines for the Decommissioning and Clean-up of Sites in Ontario (MOE, 1989)** which is currently under review. Management of waste in accordance with the 3R's - reduction, reuse, recycling is considered the most desirable option with disposal of waste being the least desirable.

The policy **redefines inert fill** and adds three new categories of fill - **urban residential fill, urban industrial fill and controlled fill**. Soil, rock and similar materials are to be classified by **bulk chemical analysis** for a number of inorganic and organic parameters in accordance with the proposed **Soil Placement Guidelines (SPG)** to determine which of the four categories and associated disposal options apply. Putrescible or decomposible material is not suitable for classification under the management scheme due to generation of methane and other decomposition gases.

The chemical basis for the SPG are the background concentrations of selected inorganic and organic parameters defined as the Ontario Typical Range for Rural Parkland (OTR_{rural}), Ontario Typical Range for Urban Parkland (OTR_{urban}) and effects based criteria developed from the MOE Decommissioning Guidelines for Agriculture/Residential/Parkland (MOE, 1989). The OTR was developed from a sampling program conducted by the MOE in 1991 to determine the range of background concentrations of inorganic and organic parameters in undisturbed parkland sites in Ontario. The soil samples analysed in this program represent the top 5 cm of soil in undisturbed parkland and the top 15 cm where the ground was tilled (MOE, 1992b).

Where the background concentration of a contaminant was not measurable, as was the case for most pesticides, phenolic compounds and some of the polycyclic aromatic hydrocarbons (PAHs), the MOE has proposed that a concentration that could be reliably determined by laboratories; specifically, the Method Detection Limit (MDL), be used as an indicator of background concentration (MOE, 1992).

The MOE (1992) noted that scientifically reliable effects based guidelines are not available for most contaminants in soil. Therefore, in developing the soil placement guidelines (SPG) for the MMP, the MOE used the current Decommissioning Guidelines for Agriculture/Residential/Parkland (MOE, 1989) and effects based guidelines from other sources including the U.S. EPA Superfund Records of Decision (ROD), Alberta Manual for Underground Storage Tanks (MUST), MOE Shell/Texaco Cleanup Guidelines and the New Netherlands Soil Quality Criteria

The proposed classes of fill are as follows:

inert fill	Material in which the constituent chemical parameters are at or below the background concentrations in undisturbed rural parkland soils (OTR_{rural}). Mandatory testing is not required for soil or rock but is required to determine whether soil like or rock like material can be classified as inert fill. However, the generator and receiver of inert fill is legally responsible for proper classification of fill and verification testing may be required.
urban residential fill	Material in which the constituent chemical parameters are at or below the background concentrations in urban parkland surface soils (OTR_{urban}).
urban industrial fill	Material in which the constituent chemical parameters have concentrations that are the lower of human or ecological health effects-based guidelines or twice the OTR_{urban} guidelines. If effects-based guidelines are unavailable, the person wishing to dispose of fill can propose a guideline in consultation with the MOE. If

	no guideline is proposed, then the guideline for urban residential fill is proposed.
controlled fill	Material in which the constituent chemical parameters have concentrations that less than 10 times the effects-based guidelines. When effects-based guidelines are unavailable, the concentration must be less than 20 times the urban residential guideline. Controlled fill must be disposed of at a site with a Certificate of Approval under Part V of the Environmental Protection Act. The MOE has proposed that **controlled fill sites not be subject to the Environmental Assessment Act (EAA).**

The policy proposes a streamlined approvals process whereby Certificates of Approval (C of A) will not be required for sites receiving urban residential or urban industrial fills. Instead a "**permit by rule**" process will be implemented that delegates responsibility for the proper management to the generator and receiver of such wastes. The "permit by rule" policy establishes: the quality of fill suitable for either urban residential or urban industrial fill; the chemical analysis required; and the records to be kept by either or both the generator and receiver of the fill. The details of the "permit by rule" process are described in Appendix 1 of the proposed policy (MOE, 1992).

Guidelines for lakefill are outlined in MOE (1992c) and classify such material as follows:

lakefill	The placement of solid material (e.g. loose earth, rubble, broken concrete) in or abutting a water body (lakes and rivers) to create structures for flood and erosion control, land creation and confined disposal facilities for dredged material. There are two categories of lakefill - confined and unconfined.
confined lakefill	To qualify as confined lakefill, a material must satisfy the chemical criteria for inert fill. Such material can be used for lakefill if placed in a confining structure from which there will be no loss to the surrounding

aquatic environment, if the confining structure is designed to withstand the maximum wave impact associated with recurrence of a 25 year storm and if the structure is protected to withstand maximum wave impact associated with a 50 year storm during placement of the fill.

unconfined lakefill

To qualify as unconfined lakefill, fill material must first satisfy the screening criteria for confined lakefill and then satisfy the chemical criteria associated with the **lowest effect level** specified in the Provincial Sediment Quality Guidelines for mandatory parameters and PCBs (**Appendix A**) with the proviso that the fill must not exceed the **no effect level** for organic compounds where the ambient sediment quality does not exceed the no effect level of the Provincial Sediment Quality Guidelines (**Appendix A**). The material must pass a **Visual Screening Test** for substances that could form objectionable deposits (scums, oil films, floating debris etc.) or impart colour, odour or taste to the water. In addition the material must pass a **Receiving Water Simulation Test** for bioaccumulative organic compounds on the mandatory list and those pesticides that exceed the **no effect level** of the Provincial Sediment Quality Guidelines for Organic Compounds.

APPENDIX III

LIST OF RESPONDENTS TO LAKEFILL AND MATERIALS MANAGEMENT REVIEWS

R.G. Aldi*	Manager, Quality Assurance & Environmental Compliance, Hiram Walker & Sons Limited, Windsor, Ontario
A.J. Anderson*	The Regional Municipality of York, Public Health Department, Newmarket, Ontario
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